DOCUMENT RESUME

ED 327 400	SE 051 847

TITLE	Mathematics Curriculum Guide K-6. Bulletin 1986, No. 47.
INSTITUTION	Alabama State Dept. of Education, Montgomery.
PUB DATE	86
NOTE	763p.; For related documents, see SE 051 846-852.
PUB TYPE	Guides - Classroom Use - Guides (For Teachers) (052) --
EDRS PRICE	MF04/PC31 Plus Postage.
DESCRIPTORS	Arithmetic; Course Content; Elementary Education; *Elementary School Mathematics; Geometry; Graphs; Instructional Materials; Kindergarten; *Learning Activities; *Mathematical Concepts; Mathematics Education; Mathematics Skills; Number Concepts; Numbers; Probability; Problem Solving; Ratios (Mathematics); Standardized Tests; State Curriculum Guides; Statistics; *Teaching Methods
IDENTIFIERS	Alabama

ABSTRACT

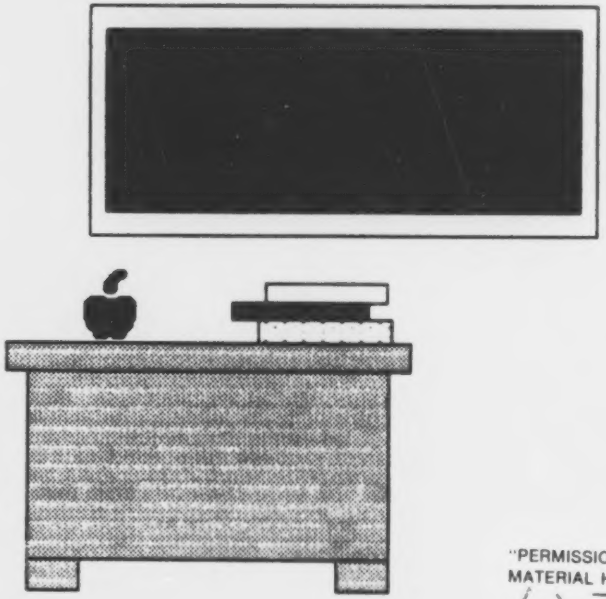
This guide is designed to help classroom teachers implement the Alabama Course of Study: Mathematics K-12. It is inclusive also of the objectives tested by the Stanford Achievement Tests and the Alabama Basic Competency Tests. One characteristic of the curriculum guide is that it clearly states what students should learn in each grade level. These objectives are called student outcomes and appear in the table of contents. The majority of the material, however, consists of classroom activities that lead students to the desired outcomes. The curriculum guide specifies what to teach as well as ways to teach it. Each section of the guide contains a specific table of contents, which lists what students should learn; activities; original sources; and student outcomes. Activities are preceded by a description of the area of mathematics covered, the specific student outcomes that are addressed in the activities, and notes for the teacher, which convey information important for effectively carrying out the activities. Topics include numeration, arithmetic, fractions, time, measurement, money, geometry, decimals, ratio, proportion, percent, graphs, statistics, and probability. (KR)

****
*   Reproductions supplied by EDRS are the best that can be made   *
*   from the original document.   *
****

SE051847

ED327400

MATHEMATICS



CURRICULUM GUIDE K-6

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it

☐ Minor changes have been made to improve reproduction quality

- Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

Bulletin 1986, No. 47

WAYNE TEAGUE
State Superintendent of Education
Alabama State Department of Education
Montgomery, Alabama

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

W. Teague

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

It is the official policy of the Alabama State Department of Education, including postsecondary institutions under the control of the State Board of Education, that no person in Alabama shall, on the grounds of race, color, handicap, sex, religion, creed, national origin, or age, be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program, activity, or employment.

3A

MATHEMATICS
CURRICULUM GUIDE
PART I — GRADES K-3

ALABAMA STATE DEPARTMENT OF EDUCATION
Wayne Teague
State Superintendent of Education

DIVISION OF STUDENT INSTRUCTIONAL SERVICES
Eldon D. Johnson
Director
Kennith S. Blankenship
Assistant Director
Richard Causey
Assistant Director

CURRICULUM DEVELOPMENT SECTION
James H. Smith, Jr.
Project Director

DEDICATION

James H. Smith, Jr., Project Director for the *Mathematics Curriculum Guide K-6*, delivered this document to the printers on September 30, 1986. Four weeks later he learned that he had cancer. Jim died on December 4, 1986, about a week after seeing the first printed guide, but before the printing was completed and before the guides had been distributed to classroom teachers. We dedicate this guide to Jim and believe that its use in Alabama classrooms will be a living testimony to the impact that he has had and will continue to have upon us and others.

Jim was an initiator. With enthusiasm he accepted the responsibility of Project Director for the first in a series of curriculum guides to be developed by the State Department of Education. Jim thought of himself primarily as a classroom teacher and held other classroom teachers in high esteem. He endorsed whole-heartedly the idea that the best guide for teachers would be one written by other classroom teachers. Jim knew how to relate to young children and believed that life in elementary schools was life at its best. He often commented that the guide that had the best chance of helping teachers teach and students learn was a guide that was activity-oriented.

For nine months Jim worked to make the *Mathematics Curriculum Guide K-6* a reality. Much of that labor was tedious and painstaking, but Jim gave the whole of himself to the project. He worked with deep affection for the teachers and students whom he believed would benefit from the guide. All teachers who use this guide in the spirit for which it was created will help make the vision of our respected co-worker and devoted friend become a reality.

FOREWORD

This *Mathematics Curriculum Guide K-6* is designed to help classroom teachers implement the *Alabama Course of Study: Mathematics K-12* (Bulletin 1984, No. 16). It is inclusive also of the objectives tested by the Stanford Achievement Tests and the Alabama Basic Competency Tests.

One characteristic of the curriculum guide is that it clearly states what students should learn in each grade level. These are called STUDENT OUTCOMES and appear in the Table of Contents. The majority of the material, however, consists of classroom ACTIVITIES that lead students to the desired outcomes. The curriculum guide, then, specifies *what* to teach as well as *ways* to teach it.

The *Mathematics Curriculum Guide K-6* is supplemental in nature. It will add to material found in textbooks and complement locally developed skills continuums, scope and sequences, and/or curriculum guides. In the past, we have been most successful when we clearly defined what students should learn, gave examples of how it can be taught, and then tested for mastery. This curriculum guide is another step in that direction.

Wayne Teague

Wayne Teague
State Superintendent of Education

INTRODUCTION

The Mathematics Curriculum Guide K-6 is the first in a series of curriculum guides to be developed by the Alabama State Department of Education. Its production is part of a larger plan to provide LEAs with a curriculum guide in every subject area K-12, immediately following the Course of Study adoption in the same subject area. The Mathematics Curriculum Guide 7-12 is packaged separately.

The Mathematics Curriculum Guide K-6 has two parts. The K-3 material is found in the first half of the document and the 4-6 material is contained in the second half. The material has been organized in this manner so that users can treat it as two documents if this is more useful.

In each part of the guide there are three distinct sections. Each begins with a TABLE OF CONTENTS which lists what students should learn (student outcomes) in each area of mathematics. After each outcome, a page number(s) directs the reader to classroom activities that address the specific outcome.

The second and largest section of the guide consists of classroom ACTIVITIES. Activities are preceded by a description of the area of mathematics covered, the specific student outcomes that are addressed in the activities, and Notes for the Teacher that convey information important for effectively carrying out the activities.

The third section is referred to as the ORIGINAL SOURCES AND STUDENT OUTCOMES portion of the guide. It summarizes the relationship of student outcomes to the original sources from which the outcomes were taken. (The original sources for the Mathematics Curriculum Guide K-6 outcomes were the Alabama Course of Study, the Stanford Achievement Test objectives, and the Alabama Basic Competency skills.) This section of the guide will serve as a reference for local school systems that may wish to trace the source of each outcome or to rate each outcome as being basic, standard, advanced.

The use of the Mathematics Curriculum Guide K-6 is not mandatory. Instead, it is offered as material that will help implement the Mathematics Course of Study; ensure curriculum validity for the Basic Competency Program; and prepare students for the Stanford Achievement Tests. The Mathematics Curriculum Guide K-6 can be used as it is in LEAs that currently have no guide, or it can serve as a starting point for developing a similar guide locally. In either case, the involvement of local educators in the development of curricula is valued and encouraged. It is hoped that this guide will bring about local expansion activities such as writing outcomes for "optional" mathematics courses; adding to the list of outcomes for a given grade level; writing additional activities in specific areas of identified weakness; rating outcomes as basic, standard, or advanced; and developing uniform end-of-unit tests.

ACKNOWLEDGEMENTS

From its inception, the development of curriculum guides has been viewed as a cooperative effort between specialists in the Division of Student Instructional Services and selected classroom teachers from the public schools of Alabama. The Curriculum Development Section, under the leadership of Katherine Mitchell, has the responsibility for coordinating this project.

Work on the Mathematics Curriculum Guide K-6 started in January 1986, when James H. Smith, Jr. was selected as Project Director and the identification of student outcomes began. The second phase of the project took place during July and August when five classroom teachers joined State Department of Education specialists in the writing of activities that teach the identified outcomes. For twelve days the following teachers offered their best ideas:

Judith Berry - Talladega City Schools
Martha Chavers - Dothan City Schools
Melinda Cook - Calhoun County Schools
Betty Dean - Sylacauga City Schools
Gail G. May - Auburn City Schools

Over a period of nine months, a team of State Department of Education specialists identified and reviewed student outcomes, wrote and rewrote activities, read activities for clarity, proofed various drafts, and provided the graphics for the guide. Those directly involved with the Mathematics Curriculum Guide K-6 were Dorothy Demars, Suzan Dunn, Elizabeth Emens, Mary Jane Herring, Beverly Hunter, Corry Hutchens, Barbara McMillin, Rosemary Mobley, Julia Pilkerton, Anne Ramsey, Frank Sconiers, Regina Stringer, and Fred Wells. We appreciate the work of these people and their co-workers, who made the adjustments and sacrifices necessary to carry out their own programs and, at the same time, made the Mathematics Curriculum Guide K-6 a division product. Others who truly exemplify this spirit of cooperation are our typists: Shirley Dorman, Brondena Ferguson, Rosemary Johnson, Robin Lanier, and Leigh Ann Lewis.

MATHEMATICS K-3

Table of Contents

PAGE

NUMERATION (pages 7 - 35)

1. Recognize the same shape when it appears in different positions. ---------- 7 - 8
2. Locate objects according to size. ---------- 7 - 8
3. Classify objects according to size. ---------- 7 - 8
4. Use vocabulary to label groups of objects. ---------- 7 - 8
5. Use the terms "same" and "different" as they apply to shapes, sizes, colors, and quantities. ---------- 7 - 8
6. Compare objects according to similarities and differences. ---------- 7 - 8
7. Order objects according to shapes and sizes. ---------- 7 - 8
8. Use vocabulary to compare groups of objects. ---------- 7 - 8
9. Answer the question "how many" for a set of objects. ---------- 9 - 14
10. Match or associate a written symbol to members of a set. ---------- 9 - 14
11. Demonstrate an understanding of one-to-one correspondence. ---------- 9 - 14
12. Count objects in a set arranged in groups of 1´s, 2´s, 5´s, 10´s to 100; 2´s, 5´s, 10´s to 1000. ---------- 9 - 14
13. Say word names in order from one to 100, 1000. ---------- 9 - 14
14. Say word names in order by 2´s, 3´s, 5´s, 10´s to 100. ---------- 9 - 14
15. Count by multiples of a number. ---------- 9 - 14
16. Identify the place value of each digit in a three-digit numeral, six-digit numeral, and a nine-digit numeral. ---------- 15 - 19
17. Name or write the numerals for a number of objects grouped as tens and ones; hundreds, tens, and ones; and thousands, hundreds, tens, and ones. ---------- 15 - 19
18. Name or write the numeral for a number shown on a chart: tens and ones; hundreds, tens, and ones; thousands, hundreds, tens, and ones. ---------- 15 - 19
19. Name or write the numeral for a given number of tens and ones; hundreds, tens, and ones. ------ 15 - 19
20. Express numbers as sums of tens and ones; hundreds, tens, and ones; thousands, hundreds, tens and ones. ---------- 15 - 19
21. Read numerals 0-20, 0-200, and 0-1000. ---------- 20 - 22
22. Write numerals 0-200 and 0-1000. ---------- 20 - 22

MATHEMATICS K-3

Table of Contents

PAGE

NUMERATION (pages 7 - 35) (Cont´d)

23. Read and write number word names, 0-200 and 0-1000. -- 20 - 22
24. Associate a number word name with equivalent expressions of that number. --------------------- 20 - 22
25. Associate a number of objects with the number expressed as an addition fact. ----------------- 20 - 22
26. Express numbers as sums of tens and ones; hundreds, tens, and ones; thousands, hundreds, tens, and ones. -- 20 - 22
27. Use terms before, between, and after in describing the position of objects in sequence. ------- 23 - 26
28. Order numbers to 20, 200, 1000. -- 23 - 26
29. Identify numbers that come just before or after a given number. ------------------------------- 23 - 26
30. Identify numbers that are one, ten, or one hundred more or less than a given number. ---------- 23 - 26
31. Identify the greatest or least of a set of numbers. -- 23 - 26
32. Identify numbers that are between two given numbers. -- 23 - 26
33. Complete a number sentence by providing the missing symbol(s). ------------------------------ 27 - 28
34. Round a two-digit number to the nearest ten. -- 29 - 31
35. Round a three-digit number to the nearest hundred or ten. ----------------------------------- 29 - 31
36. Identify numbers as odd or even. --- 32
37. Write the Arabic numerals for Roman numerals to L and vice versa. --------------------------- 33 - 34
38. Use ordinal numbers to describe an object´s relative position in a sequence: first through fifth, first through twelfth, first through twentieth, and first through hundredth. ----------- 34 - 35

ADDITION (pages 36 - 58)

1. Look at and combine groups of sets. -- 36 - 41
2. Verbalize the addition process by combining sets to tell how many. ------------------------- 36 - 41
3. Use manipulatives to solve simple addition problems. --------------------------------------- 36 - 41
4. Name or write the sums to basic addition facts. -- 36 - 41
5. Identify and demonstrate an understanding of addition fact families. ------------------------ 36 - 41
6. Illustrate the addition process using a number line. -- 36 - 41

MATHEMATICS K-3

Table of Contents

PAGE

ADDITION (pages 36 - 58) (Cont´d)

7. Add three one-digit addends. ---------- 42 - 45; 57 - 58
8. Add three addends of no more than two digits. ---------- 42 - 45; 57 - 58
9. Add more than three addends. ---------- 42 - 45; 57 - 58
10. Use various methods to check addition problems. ---------- 46 - 47; 57 - 58
11. Locate calculation errors in addition problems. ---------- 46 - 47
12. Solve two and three-digit problems to 999 with no regrouping. ---------- 48 - 50; 57 - 58
13. Solve two and three-digit problems to 1000 with regrouping. ---------- 48 - 50
14. Identify a number sentence appropriate to solving an addition problem. ---------- 51 - 53
15. Write a number sentence from a vertical addition problem. ---------- 51 - 53
16. Write a number sentence from a story problem. ---------- 51 - 53
17. Name the sum when zero is an addend. ---------- 54 - 56
18. Name the missing addend in an addition sentence in which the addends have been regrouped. ----- 54 - 56
19. Name the missing addend in an addition sentence in which the addends have been reordered. ----- 54 - 56

SUBTRACTION (pages 59 - 71)

1. Verbalize the subtraction process by taking objects away from a set. ---------- 59 - 61
2. Use manipulatives to solve simple story problems. ---------- 59 - 61
3. Solve problems with minuends not to exceed 18. ---------- 59 - 61; 69 - 71
4. Illustrate the subtraction process using a number line. ---------- 59 - 61
5. Write subtraction sentences after hearing or reading simple subtraction problems. ---------- 59 - 61
6. Solve problems with zero as the subtrahend. ---------- 59 - 61; 69 - 71
7. Use addition to check the answers to completed subtraction problems. ---------- 62 - 64
8. Locate calculation errors in subtraction problems. ---------- 62 - 64
9. Solve subtraction problems involving one, two, and/or three-digit numbers without regrouping. ---------- 65 - 68; 69 - 71
10. Solve subtraction problems involving one, two, and/or three-digit numbers with minuends to 100, 1000, regrouping. ---------- 65 - 68; 69 - 71

MATHEMATICS K-3

Table of Contents

PAGE

MULTIPLICATION (pages 72 - 79)

1. Name the product when zero (0) or one (1) are used as multipliers. ---------- 72 - 77
2. Name the missing factor in a multiplication problem in which the factors have been reordered or regrouped. ---------- 72 - 77
3. Demonstrate an understanding of basic multiplication facts. ---------- 72 - 77
4. Multiply using multipliers of one-digit and multiplicands of two-digits, three-digits. ---------- 72 - 77; 78 - 79

DIVISION (pages 84 - 86)

1. Separate sets of objects into equivalent subsets in groups of 2, 3, 4, and/or 5. ---------- 80 - 84
2. Use repeated subtraction to represent division.---------- 80 - 84
3. Divide using a one-digit divisor and a dividend of not more than 45 no remainder, 45 remainder, 99 no remainder. ---------- 80 - 84; 85 - 86
4. Use multiplication to check division problems. ---------- 80 - 84

FRACTIONS (pages 87 - 91)

1. Recognize that objects can be divided into fractional parts. ---------- 87 - 91
2. Identify the fraction represented as portions of objects: 1/2, 1/3, 2/3, 1/4, 3/4, 1/5, and 1/10. ---------- 87 - 91
3. Identify the fractional parts of members in set: 1/2, 1/3, 2/3, 1/4, and 3/4. ---------- 87 - 91
4. Recognize combinations of fractions that make a whole. ---------- 87 - 91
5. Compare fractions with like demoninators. ---------- 87 - 91
6. Order like fractions with like demonimators. ---------- 87 - 91
7. Demonstrate an understanding of fractional parts of a whole by applying knowledge to realistic situations. ---------- 87 - 91

MATHEMATICS K-3

Table of Contents

PAGE

TIME, MEASUREMENT, AND MONEY (pages 92 - 111)

1. Use vocabulary to describe quantity. 92 - 97
2. Recognize that objects can be measured. 92 - 97
3. Use nonstandard units to measure objects. 92 - 97
4. Recognize and use the following measurements: inch, foot, quart, pint, gallon pound, ounce, degree, centimeter, millimeter, liter, gram, kilogram. 92 - 97
5. Use a ruler to measure distances to the nearest one-half inch and nearest centimer. 92 - 97
6. Measure capacities in whole or half units. 92 - 97
7. Look at an object and estimate the unit of measurement to be used. 92 - 97
8. Identify the temperature of boiling water, normal body temperature. 92 - 97
9. Solve simple word problems involving customary measurement, metric measurement. 92 - 97
10. Read a therometer in degrees Celsius and Fahrenheit. 92 - 97
11. Tell time on circular or digital clock to 1/2 hour, 1/4 hour. 98 - 102
12. Solve problems involving elapsed times in 15, 30, or 60 minute increments. 98 - 102
13. Determine the difference in the time on two clocks. 98 - 102
14. Identify morning, afternoon, and night. 103 - 104
15. Name and identify in sequence days of the week, months of the year. 103 - 104
16. Use a monthly calendar to identify specified days or dates. 103 - 104
17. Identify and name common U.S. coins and dollar bill. 105 - 108
18. Name or write the value of a set of coins and/or currency. 105 - 108
19. Solve problems involving money. 105 - 108
20. Convert coins to equivalent value. 105 - 108
21. Make change to one dollar using appropriate coins. 105 - 108
22. Know his/her own telephone number, birthdate, zip code. 109 - 111
23. Distinguish between and identify telephone, area code, and address numbers. 109 - 111

MATHEMATICS K-3

Table of Contents

PAGE

GEOMETRY (pages 112 - 124)

1. Use vocabulary to describe position. ---------- 112 - 114
2. Recognize and name square, rectangle, triangle, circle. ---------- 112 - 115; 122 - 123
3. Recognize simple congruent shapes and figures. ---------- 112 - 115
4. Recognize and name lines, line segments, rays, angles, polygons, lines of symmetry. ---------- 112 - 115; 122 - 123
5. Calculate the perimeter of a square and/or rectangle. ---------- 112 - 115
6. Find the area of plane figures by counting square units. ---------- 112 - 115
7. Identify and name the solid figures cone, cube, sphere. ---------- 112 - 115
8. Identify cube as a unit of volume. ---------- 116 - 117
9. Interpret graphs using real objects. ---------- 118 - 121
10. Interpret information on a pictograph, bar graph, line graph, circle graph, map, chart. ---------- 118 - 121; 124
11. Use information to construct a line graph, bar graph, circle graph. ---------- 118 - 121

APPLICATIONS (pages 125 - 126)

1. Compose and solve simple story problems. ---------- 125 - 126
2. Solve word problems involving addition, subtraction, and/or multiplication. ---------- 125 - 126
3. Determine the necessary operation needed to solve a word problem. ---------- 125 - 126
4. Identify the information needed to solve a word problem. ---------- 125 - 126

ORIGINAL SOURCES AND STUDENT OUTCOMES ---------- 127 - 155

MATHEMATICS
K - 3

AREA: NUMERATION

OUTCOMES:
1. Recognize the same shape when it appears in different positions.
2. Locate objects according to size.
3. Classify objects according to size.
4. Use vocabulary to label groups of objects.
5. Use the terms "same" and "different" as they apply to shapes, sizes, colors, and quantities.
6. Compare objects according to similarities and differences.
7. Order objects according to shapes and sizes.
8. Use vocabulary to compare groups of objects.

NOTES FOR THE TEACHER

Steps to Success

1. Classification and comparing are activities that should be carried on throughout the year.
2. Involve students and parents in gathering common manipulatives. Store these collections. They are the materials needed for this section.
3. Introduce vocabulary through music, stories, books, and fingerplays.

ACTIVITY 1 - OUTCOME 1

Play "move it-prove it" with flannelboard shapes. Place two or three different shapes on the flannelboard. Ask a student to prove that the shape you hold in your hand is the same shape as one on the flannelboard. The student places the match on top of his choice. The positions of the shapes may vary but the "match" can be turned to fit.

Example:

FIND THIS SHAPE:

ACTIVITY 2 - OUTCOME 2

Ask students to choose a large cookie or a small cookie for recess. Write each student's name on a small paper plate. Each student chooses a cookie, puts it on his plate, and places the plate in a row for plates with large cookies or in a row with plates for small cookies. Discuss "largeness" and "smallness." One-to-one matching and more and less can also be discussed.

ACTIVITY 3 - OUTCOMES 2, 3, 4, 6, and 8

MYSTERY BOX/CAN: Place an assortment of different sized objects in a mystery can. Make a mystery can by covering a coffee can. Cut off an old sock in order to use the top-rib section. Tape the edge of the sock to the tip of the can. The student must feel inside the can and find an object by its size. For example: Find the smallest object in the can. Empty the can and compare objects by similarities and differences.

ACTIVITY 4 - OUTCOME 5

Play a paper chain game. Use pre-made paper chains with varying quantities of loops 1-5. Use two paper bags. Place some of the chains in each bag. Two students at a time pull a chain from a bag and compare the chains. Ask questions. For example, which chain has fewer loops?

ACTIVITY 5 - OUTCOMES 7 and 8

The following activities may be placed in learning centers:

1. Cut a set of dowel rods into varying lengths and have the students order longest-shortest or shortest-longest.
2. Fill plastic juice containers with varying amounts of a filling material. The students order the containers by weight.
3. Use discarded paint chips of one color. Mount the chips on cards. Students order the chips by color: darkest to lightest or lightest to darkest.

ACTIVITY 6 - OUTCOME 5

Collect real or toy objects that are one of the basic shapes (for example, a rectangular book). Each student selects an item and identifies the shape by placing it in a row of like-shaped objects, thus making a real graph. Discuss "same" and "different" in terms of shapes and quantity.

AREA: NUMERATION

OUTCOMES:
9. Answer the question "how many" for a set of objects.
10. Match or associate a written symbol to members of a set.
11. Demonstrate an understanding of one-to-one correspondence.
12. Count objects in a set arranged in groups of 1´s, 2´s, 5´s, 10´s to 100; 2´s, 5´s, 10´s, 100´s to 1000.
13. Say word names in order from one to 100, 1000.
14. Say word names in order by 2´s, 3´s, 5´s, 10´s to 100.
15. Count by multiples of a number.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Have experiences with patterning before preceding to counting by multiples.

Steps to Success

1. Inclusion and conservation of number are two important counting concepts.
2. The sequence of number words must be memorized by the students, but that knowledge alone will not lead to the understanding of numbers.
3. Children need manipulative activities in order to build an understanding of the relationships between numbers.
4. Even concepts which must be memorized should be understood first.
5. Symbols are introduced only after they are needed to label groups or quantities.
6. Large multiples of a number should be taught with place value concepts.
7. Relationships between numbers must be taught.

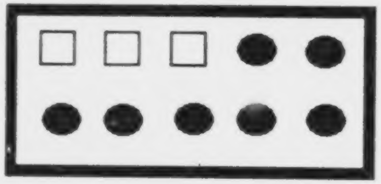
ACTIVITY 1 - OUTCOME 13

Give each student a set of manipulatives (cubes, sticks, beans, etc.). The students slide cubes one at a time toward themselves as they practice counting orally with the teacher to a designated number.

ACTIVITY 2 - OUTCOMES 9, 10, and 11

Give each student a worksheet with 2 rows of 5 dots each. Say a number. The students place that many construction paper squares, one per dot, on their papers. The students must add squares or take away squares to have the number called by the teacher.

Example: Teacher says, 3



Students can also write the numerals that correspond to the number of squares or dots.

ACTIVITY 3 - OUTCOME 12

Arrange sets of sticks in groups of two. Have students name the total number of sticks.

Example: | |

| | number six

| |

Also, arrange sets in groups of 1's, 5's, and 10's with totals to 100 and 1000.

ACTIVITY 4 - OUTCOME 13

Number puzzles. Use a student-made or teacher-made 1-100 chart for each puzzle. The puzzle is mounted on tagboard and cut into 10 pieces, cutting on the lines only. The student making the puzzle writes his name on the back of each piece. Store the puzzle in an envelope. Trade envelopes with a friend and try his puzzle. After putting the puzzle together, students may say each number on the chart to a friend.

Example:

1 2 3 4 5 6 7 8 9 10

11 12 13 14 15 16 17 18 19 20

21 22 23 24 25 26 27 28 29 30

31 32 33 34 35 36 37 38 39 40

41 42 43 44 45 46 47 48 49 50

51 52 53 54 55 56 57 58 59 60

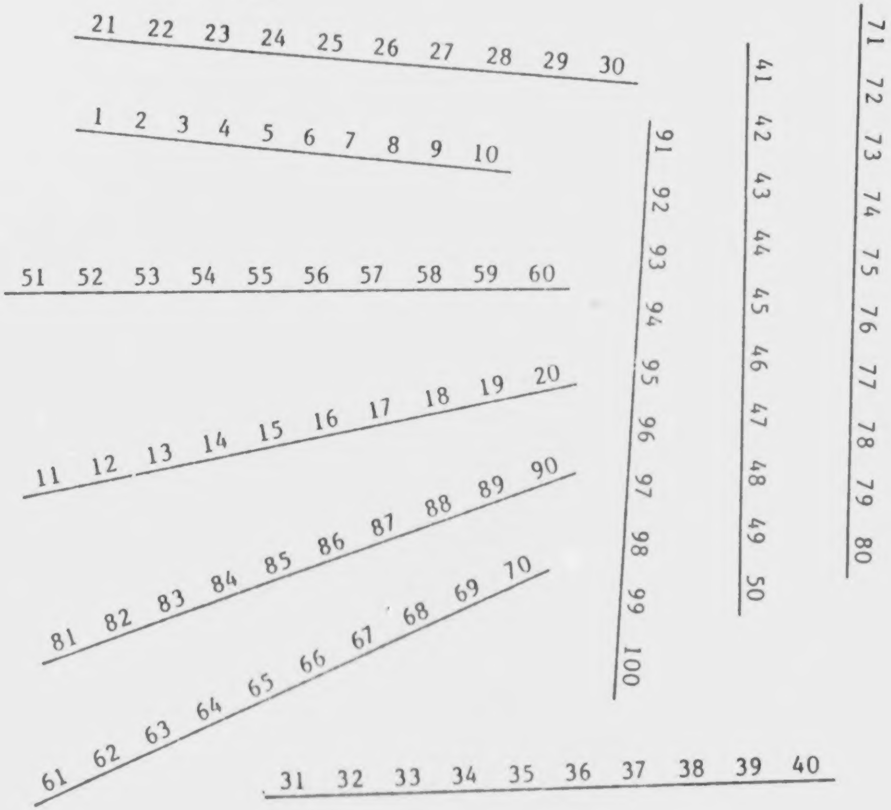
61 62 63 64 65 66 67 68 69 70

71 72 73 74 75 76 77 78 79 80

81 82 83 84 85 86 87 88 89 90

91 92 93 94 95 96 97 98 99 100

Put the pieces of the chart in the correct order:
1 - 100


21 22 23 24 25 26 27 28 29 30
1 2 3 4 5 6 7 8 9 10
51 52 53 54 55 56 57 58 59 60
11 12 13 14 15 16 17 18 19 20
81 82 83 84 85 86 87 88 89 90
61 62 63 64 65 66 67 68 69 70
31 32 33 34 35 36 37 38 39 40
91 92 93 94 95 96 97 98 99 100
41 42 43 44 45 46 47 48 49 50
71 72 73 74 75 76 77 78 79 80

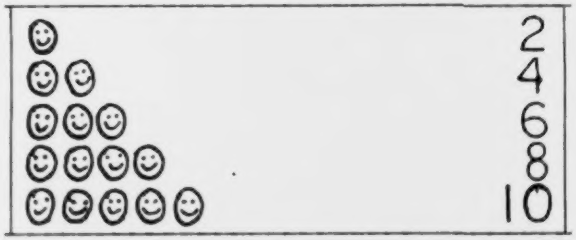
ACTIVITY 5 - OUTCOME 13

"Race for 20" is a counting game. It may be played by 2 - 4 children who take turns saying either 1 or 2 numbers. The first person says "1" or "1, 2". The second person continues with 1 or 2 more numbers until 20 is reached.

ACTIVITY 6 - OUTCOMES 14 and 15

EYES PATTERN - Have one student stand up. Ask the class how many eyes one child has. How many eyes do two children have? Students record the findings and predict how the pattern would continue.

Example:



Make a permanent chart of counting by 2´s.

Use other common objects to show counting by other multiples.

ACTIVITY 7 - OUTCOMES 9, 10, and 11

Let children use a variety of materials to make designs of a given quantity, or number.

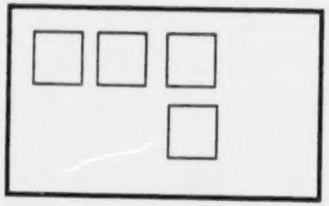
Collect and store in individual boxes many common manipulative materials. (example: toothpicks, buttons, beans, etc.). Prior to structured activities, model the activities for the students and allow students free time with the materials.

The task for the students is to make designs of a specified number with the materials.

EXAMPLES OF MATERIALS AND RECORDING SHEETS

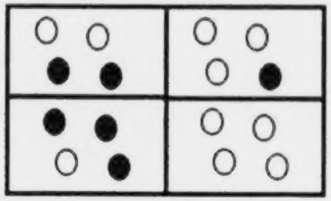
A) CONSTRUCTION PAPER SQUARES

GLUE pre-cut shapes into the designs.



4 squares

B) PAPER BINGO
MARKERS - USE AS ARE OR
SPRAY PAINT ONE SIDE.

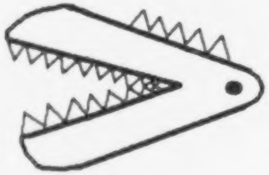


4 markers arranged in different patterns

ACTIVITY 8 - OUTCOMES 9 and 10

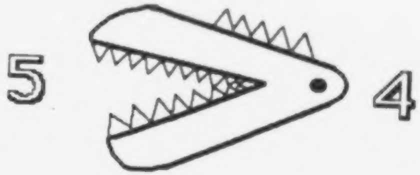
DRAGON COMPARISONS - For each student, make a paper dragon to use as a tool for remembering the more than > and less than < symbols. From green poster board, draw the dragons using the symbol as a guide. Make each dragon reversible.

Example:

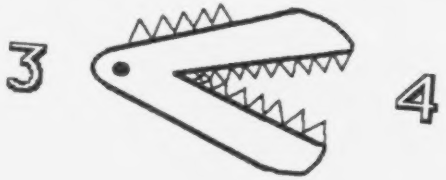


Model the use of the dragon to the children. Make up a story about how dragons love to eat what is larger. They would always eat the larger number. Their mouths are open when they eat and they look at what is larger.

Using sets of counters (lower levels) or numeral cards direct the students into the correct placement of the dragon. Example:



turn the dragon
over for



Explain the process of reading left to right. For example, 5 is more than 4; 3 is less than 4. The dragon always eats the one with more but we can't always "read" that number first.

MATHEMATICS
K - 3

AREA: NUMERATION

OUTCOMES:
16. Identify the place value of each digit in a three-digit numeral, six-digit numeral, and a nine-digit numeral.
17. Name or write the numerals for a number of objects grouped as tens and ones; hundreds, tens, and ones; and thousands, hundreds, tens, and ones.
18. Name or write the numeral for a number shown on a chart: tens and ones; hundreds, tens, and ones; and thousands, hundreds, tens, and ones.
19. Name or write the numeral for a given number of tens and ones; hundreds, tens, and ones.
20. Express numbers as sums of tens and ones; hundreds, tens, and ones; and thousands, hundreds, tens, and ones.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Have previous experiences making comparisons and patterning.
2. Count and order numbers.

Steps to Success

1. Have items available for students to use and experience before actually "introducing" or "teaching" place value (ice-cream sticks, straws in groups of ten with a rubber band, blocks, cusienaire rods.)
2. Do not rush students. Allow ample time with concrete experiences before going to the abstract.

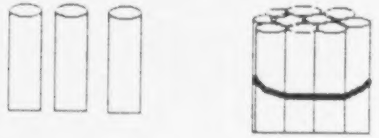
41

42

ACTIVITY 1 - OUTCOMES 16 and 19

Using place value blocks or counting sticks make a number and have students say the word name.

Example:



Students say: thirteen

ACTIVITY 2 - OUTCOME 16

On the board or on a teacher prepared worksheet, list various numerals and underline one digit in each. Have the students identify the place value of that digit.

Example: 1. 163 - tens 2. 136,594 - ten thousands

ACTIVITY 3 - OUTCOME 16

"Place Value Turn Over"

Divide students into groups of six and give each of the six students a card with one number on it (1-9). Use the same six numbers for all of your groups. Call out numbers such as 652,134 and have students arrange themselves in the correct order. Use various combinations of the six numbers. Examples: 253,146; 432,156; 164,532

Extension: You may divide students into groups of three, six, or nine according to level of difficulty.

ACTIVITY 4 - OUTCOME 17

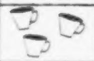
Read a preselected story and have students listen for a common word such as "the" or "and." Tell students that they are going to listen for the magic word "____." When they hear it in the story, they are to put a mark on their papers. Upon completion of the story, have students go back and circle each group of ten. Count and see how many times the magic word was used. Example: (||||||||||) (||||||||||) |||

Write the numeral that matches the number of times the magic word was used. 23

ACTIVITY 5 - OUTCOME 17

Make a place value chart (posterboard, flannelgraph board, magnetic board). Give each student a handful of beans. Have small paper cups available and have students count the beans, putting ten in each cup. Count and record results on the place value chart.

Extension: Students may trade in 10 cups for one larger container which represents one hundred.

Hundreds	Tens	Ones
		● ● ● ●

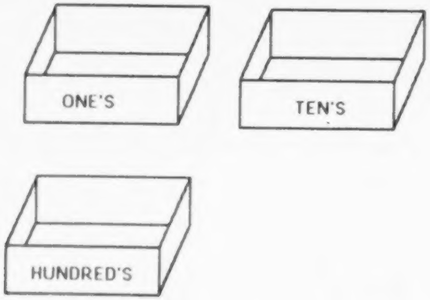
ACTIVITY 6 - OUTCOMES 17 and 18

Make "tens" and "ones" signs for children to wear. Have two children stand in front of the classroom. The child on the left wears the "tens" sign, and the child on the right wears the "ones" sign. Have the two children hold up any number of fingers fewer than ten. The other children are to say the number of tens and ones shown. After this, separate the class into groups of two. One child in each group will be the "tens" and one will be the "ones." As the teacher writes a number on the chalkboard in a place value chart, the children in each pair must hold up the correct number of fingers.

Extension: As you progress, you may use groups of three or more students to include hundreds, thousands, etc.

ACTIVITY 7 - OUTCOME 18

At a learning center have available 3 boxes, construction paper cards, pencils, and duplicated sheets. Have pairs of children write the numbers 1 to 9 on pink construction paper cards and place them in a box labeled "hundreds." Have the children do the same on green cards and put them in the "tens" box, and on orange cards to be placed in a box labeled "ones."



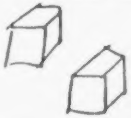
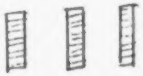
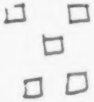
Provide each student with a duplicated sheet formatted like the one below. The children take turns choosing a card from each box and filling in the chart.

Name	Hundreds	Tens	Ones	Write the number
Jeff	3	4	1	341
Ann	1	9	8	198

ACTIVITY 8 - OUTCOME 18

Using place value blocks and/or number strips and a place value chart, put blocks under each heading and have students write the numeral.

Example:

Hundreds	Tens	Ones
		

235

ACTIVITY 9 - OUTCOME 19

Call out numbers and have the students write them down. Numbers should be called out representing hundreds, tens, and ones.

Example: Teacher says:

5 hundreds, 3 tens, and 3 ones
Students should write: 533

ACTIVITY 10 - OUTCOME 20

Give students a list of numbers written in expanded form. Students should write the standard numeral for each number.

Example: 300 + 50 + 6 = 356

Students may be given the standard numeral and asked to write the number in expanded form.

Example: 356 = 300 + 50 + 6

MATHEMATICS
K - 3

AREA: NUMERATION/READING NUMBERS

OUTCOMES:

21. Read numerals 0-20, 0-200, and 0-1000.
22. Write numerals 0-200 and 0-1000.
23. Read and write number word names 0-200 and 0-1000.
24. Associate a number word name with equivalent expressions of that number.
25. Associate a number of objects with the number expressed as an addition fact.
26. Express numbers as sums of tens and ones; hundreds, tens, and ones; and thousands, hundreds, tens, and ones.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Count by rote.

Steps to Success

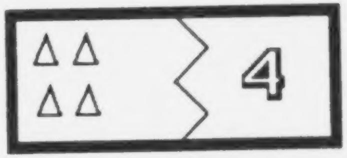
1. For students to be successful they need to be able to perform pre-number tasks such as classifying and finding relations between sets.

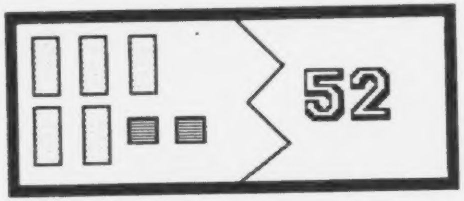
2. Introduce 0 (zero) after teaching numerals 1-10.

ACTIVITY 1 - OUTCOME 21

Make a set of puzzles to help children associate abstract number symbols with a number grouping. Use posterboard and store in a plastic bag.

Example:





Extension: Make the same type cards using pictures of place value blocks.

ACTIVITY 2 - OUTCOMES 21 and 22

Cut numerals from coarse sandpaper and paste them on posterboard cards. Place the cards in a bag. Children feel a numeral in a bag and try to guess what it is. The card is removed from the bag to check the child's guess. Children can make a list of the numerals that were correctly identified.

ACTIVITY 3 - OUTCOME 23

This is a small group activity. Have a box filled with teacher-made number word cards. Each student selects a card from the box. The student's card with the greatest value wins the other cards of that round. Rounds are continued until the box is empty. At the end of the playing time, the student with the greatest number of cards is the winner.

ACTIVITY 4 - OUTCOME 24

In a small group activity, have a box filled with teacher-made number word cards.

Example:

forty-two

Prepare a game board with numbers expressed in expanded form.

Example:

32 + 10	11 + 6	16 + 3
0 + 7	8 + 2	9 + 10
45 + 6	50 + 3	61 + 8
18 + 6	13 + 2	6 + 6

Students will pick a number word card and place it on its equivalent expression.

Example:

forty - two

32 + 10	11 + 6	16 + 3
0 + 7	8 + 2	9 + 10
45 + 6	50 + 3	61 + 8
18 + 6	13 + 2	6 + 6

ACTIVITY 5 - OUTCOME 25

Refer to Addition, Outcome 4.

ACTIVITY 6 - OUTCOME 26

Refer to Numeration, Outcome 20, Activity #10.

MATHEMATICS
K - 3

AREA: NUMERATION

OUTCOMES:

27. Use terms before, between, and after in describing the position of objects in sequence.
28. Order numbers to 20, 200, and 1000.
29. Identify numbers that come just before or after a given number.
30. Identify numbers that are one, ten, or one hundred more or less than a given number.
31. Identify the greatest or least of a set of numbers.
32. Identify numbers that are between two given numbers.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Count by rote.

Steps to Success

1. Ordering of numbers is a skill that should to be reinforced throughout the school year.
2. A number line up to 20 on each child´s desk is helpful.
3. A number line up to 100 should be available in the classroom.

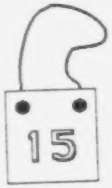
ACTIVITY 1 - OUTCOME 27

Lay out a pattern of colored cubes in three or more colors. Beads, buttons, or counters can substitute for cubes. Ask students to reproduce the pattern with their own cubes. Ask questions about the colors of the cubes. Examples: What color comes before the red cube? After the red cube? What color is between the green and red cubes? Make a variety of patterns and allow students to become familiar with the terminology.

ACTIVITY 2 - OUTCOME 28

Write the numbers 1-20 on cards (approximately 5" x 6"). Attach yarn on string as shown. Each student wears a number card around his/her neck. Students are asked to line up in numerical order. Students swap cards and the activity is repeated.

Example:



ACTIVITY 3 - OUTCOME 29

Use dot-to-dot fun sheets. Ask questions (for example: What number comes after 6?)

ACTIVITY 4 - OUTCOMES 28 and 29

In a large group activity, the teacher calls out various numbers, then pauses and claps. The students then call out the number that comes next. For example, the teacher calls out 4, 5, 6 ... pauses ... and claps. Students should then say 7.

Extension: Call out a number and have students identify the number that should come before it.

ACTIVITY 5 - OUTCOMES 28 and 29

Make a large STOP sign. Have a child begin to count from one. After five or six numbers, hold up the sign and call on another child. The second child continues the counting until you hold up the sign again. Continue until your counting reaches the desired stopping point.

ACTIVITY 6 - OUTCOME 30

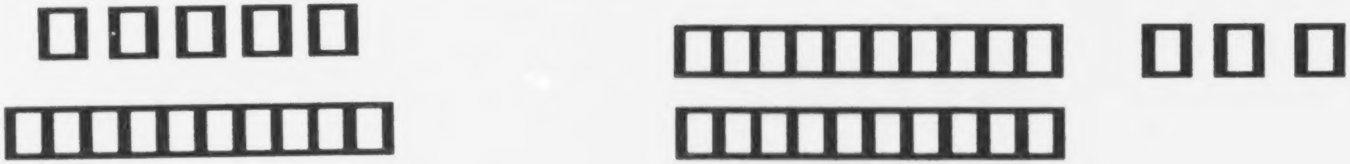
Give the children duplicated sheets of a number pattern to 100, formatted as below, and have the children complete the pattern.

Example:	1	2	3	4	5	6	7	8	9	10
	11	___	___	___	___	___	___	___	___	20
	21	___	___	___	___	___	___	___	___	___
	31	___	___	___	___	___	___	___	___	___

ACTIVITY 7 - OUTCOME 31

Cut ten-strips and one-strips for the overhead projector or display board. Use the strips to show two numbers between 10 and 100.

Example:



Have the children write the numbers and tell which of the numbers is greater. Make sure the children understand that the number with more tens is greater. If the numbers have the same number of tens, have the children compare the number of ones.

Extension: Write various numerals on cards. Have a student come up to find the least number and another student to find the greatest number.

ACTIVITY 8 - OUTCOMES 30 and 32

Make teacher-prepared number cards one through ninety-nine. Give each student three or four cards. On the chalkboard write a series of numbers (for example: 23, ___, 25). The student with card number 24 stands up and brings it up to the chalkboard. Continue until students have used all their cards.

A variation of this activity can be used on another day. Place the number cards in a sack. Each student takes out 3 or 4 cards. A designated "caller" calls out a number between 1 and 99. The student who has drawn this card from the sack holds it up. Ask questions about numbers more or less than the given number.

Example: Who has a number 10 more than 36? (A student holds up 46).
Who has a number 1 less than 36? (A student holds up 35).

MATHEMATICS
K - 3

AREA: NUMERATION

OUTCOME: 33. Complete a number sentence by providing the missing symbol(s).

NOTES FOR THE TEACHER

Prerequisites for Students

1. Have an understanding of the symbols and the operations they represent.

Steps to Success

1. Explain that symbols give directions or tell what is to be done in number sentences.
2. Review symbols.
3. Point out that what is on the left side of the equal sign may not look just like the right side, but both sides must name the same number.

ACTIVITY 1 - OUTCOME 33

Play a listening game as a teacher directed, large group activity. Students will be given three numbers with a very important symbol missing. Tell students that their help is needed in finding the missing "direction". The students will respond "plus" or "minus"

Examples like the following will be spoken to students. Teachers should pause where there is a place for a missing symbol.

Examples: $5 \square 3 = 8$ $6 \square 3 = 9$ $7 \square 4 = 3$

Extension: The same activity may be used to include multiplication and division.

ACTIVITY 2 - OUTCOME 33

Follow the directions for Activity 1. As students progress, have them write down only the missing symbol on a teacher prepared worksheet similar to the one below.

Example:

Name Date

1	2	3
4	5	6
7	8	9
10	11	12

MATHEMATICS
K - 3

AREA: NUMERATION

OUTCOMES:
34. Round a two-digit number to the nearest ten.
35. Round a three-digit number to the nearest ten or hundred.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Compare and order numbers.
2. Count by 10's and 100's.
3. Determine greater than and less than.

Steps to Success

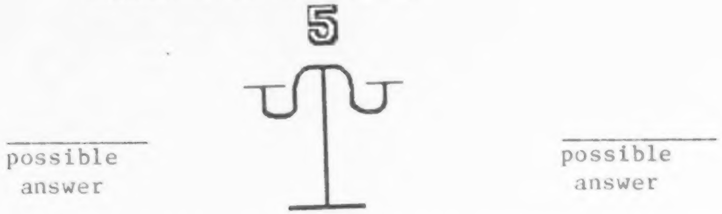
1. When rounding a number to the nearest ten, have students focus on the number in the ones column.
2. When rounding a number to the nearest hundred, tell students to focus on the number's value in the tens and ones column.

   Example: 234...attention should be focused on 34.

ACTIVITY 1 - OUTCOMES 34 and 35

Draw a "rounding scale" on the chalkboard.

NUMBER TO BE ROUNDED: 67



Bring the student´s attention to the number 5. The number 5 is the balance on the scale and helps determine the correct answer.

First, direct students to look at the number 67 to determine the possible answers. If 67 is rounded upward, the nearest ten will be 70. If 67 is rounded downward, the nearest ten will be 60. Fill in the two possible answers on the "rounding scale".

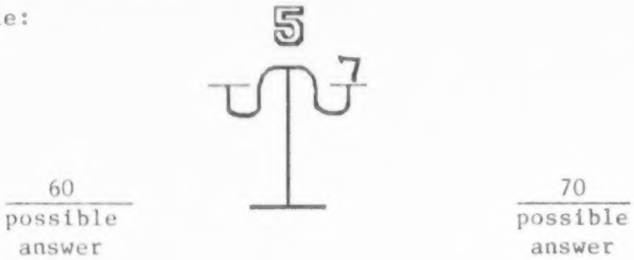
When rounding to the nearest ten, tell students to focus on the number in the one´s column.

In the number 67, 7 is in the one´s column. Determine if 7 is greater than or less than the balance of 5.

ACTIVITY 1 - OUTCOMES 34 and 35 (Cont´d)

If 7 were less than 5, it would be placed on the left side of the scale. Since 7 is greater that 5, it should be placed on the right side of the scale.

Example:



The 7 will tip our scale toward the possible answer of 70.

Extension: This same process can be used to round three-digit numbers to the nearest hundred. With three-digit numbers, focus on the number´s value in the tens and ones column. Also REMEMBER to replace the number 5 with the number 50 as the balance on the rounding scale.

AREA: NUMERATION

OUTCOME: 36. **Identify numbers as odd or even.**

NOTES FOR THE TEACHER

Prerequisites for Students

1. Count and order numbers from 1 to 100.

Steps to Success

1. Provide many opportunities for patterning and number relationship activities.

ACTIVITY 1 - OUTCOME 36

Explain that when a number is divided into 2 equal parts and one is left over, that number is called an "odd" number. Using unifix cubes, choose a number and ask students to snap together that many cubes. Tell the students to make two trains of the same length with the cubes they hve snapped together. Ask if the trains have the same number of blocks. If so, the number chosen was an even number. If the trains do not have the same number of blocks, then the number chosen was an odd number. Continue activity using other numbers.

ACTIVITY 2 - OUTCOME 36

As a class, circle odd numbers on a 0-99 chart. Can the children discover the pattern?

MATHEMATICS
K - 3

AREA: NUMERATION

OUTCOME: 37. Write the Arabic numeral for Roman numerals to L and vice versa.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Order standard numbers 1-50.

Steps to Success

1. The value of Roman numerals is usually the sum of the numbers represented.

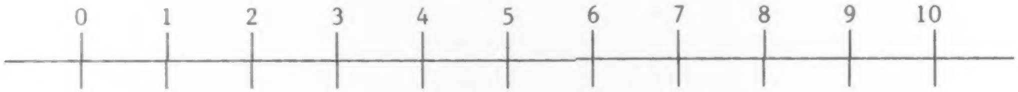
   XXVII
   20 + 5 + 2 = 27

2. Exceptions are IV (4), IX (9), XIV (14), XIX (19), XXIV (24), XXIX (29), XXXIV (34), XXXIX (39), XLIV (44), and XLIX (49). An explanation of these exceptions is found in the Mathematics Curriculum Guide, Grades 4-6.
3. The Roman numeral system has no place value.

ACTIVITY 1 - OUTCOME 37

Draw a number line on the chalkboard with Arabic (standard) numerals.

Example:

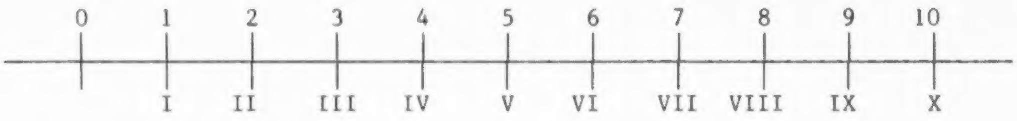


Point out to students that Roman numerals have no symbol for 0.

ACTIVITY 1 - OUTCOME 37 (Cont´d)

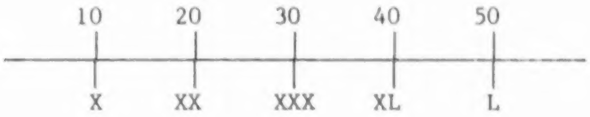
Fill the bottom half of the number line with Roman numerals.

Example:


0
1
2
3
4
5
6
7
8
9
10
I
II
III
IV
V
VI
VII
VIII
IX
X

Use the same process for introducing "tens" in Roman numerals.

Example:


10
20
30
40
50
X
XX
XXX
XL
L

After students understand how to write Roman numerals I-X (1-10) and tens X-L (10-50), they can write any Roman numeral I-L.

MATHEMATICS
K - 3

AREA: NUMERATION

OUTCOME: 38. **Use ordinal numbers to describe an object´s relative position in a sequence: first through fifth, first through twelfth, first through twentieth, and first through hundredth.**

NOTES FOR THE TEACHER

Prerequisites for Students

1. Count by rote.

Steps to Success

1. Use opportunities throughout the school year to reinforce ordinal numbers. Use stories, finger plays, etc.
2. Everyday situations can also be used such as "This is the third rainy day we´ve had this week."
3. Point out to students that most ordinal names are very much like number names they can already say. (For example: eight - eighth. First, second and third are the exceptions.)

ACTIVITY 1 - OUTCOME 38

To introduce the ordinal numbers, have five children stand in line. Beginning with the first child and continuing in order to the fifth, have the other children say the ordinal number for each child´s position in the line. Follow up with questions. (For example: What is the third child´s name?)

ACTIVITY 2 - OUTCOME 38

Place twelve different objects in a row on a table. Put a book at one end of the row. Place an eraser at the other end of the row. Ask questions such as: "Which object is second from the eraser?" or "What is the fourth object from the book?"

Extension: Have children rearrange the objects to occupy specific places.
Extension: Discuss months of the year in their ordinal positions.

MATHEMATICS
K - 3

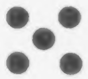
AREA: ADDITION

OUTCOMES:
1. **Look at and combine groups of sets.**
2. **Verbalize the addition process by combining sets to tell how many.**
3. **Use manipulatives to solve simple addition problems.**
4. **Name or write the sums to basic addition facts.**
5. **Identify and demonstrate an understanding of addition fact families.**
6. **Illustrate the addition process using a number line.**

NOTES FOR THE TEACHER

Prerequisites for Students

1. Recognize one-to-one correspondence prior to beginning addition.
2. Demonstrate ability in the following skills:
   (a) Recognizing numerals 0-9
   (b) Forming sets of objects 1-10
   (c) Matching numerals to the sets of objects 1-10
   (d) Ordering numbers 0-9
   (e) Understanding concept of number 0-9
   (f) Counting by rote to 30
   (g) Recognizing instantly small groups/sets such as:



Steps for Success

1. Do not rush students through manipulative activities to symbolic activities.
2. Focus on one number and its combinations, doing three or four activities during a lesson period. This way, students have a variety of experiences with the same combinations. Aim for combination recognition of 4, 5, 6 before working with 7, 8, 9, 10.
3. The goal of addition is not to learn merely to count both sets. "Counting on" is a useful skill in helping students count forward from a given number to determine a total.

ACTIVITY 1 - OUTCOMES 1, 2, 3, and 4

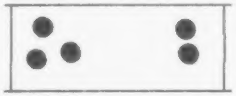
Prepare gameboards for each student to work at an independent level.

Example:

Addition

Use the gameboards in the following ways:

Teacher says: "Three and two"



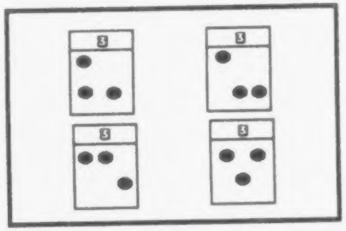
Student: Puts three objects on one side of the gameboard and two on the other side.

As soon as the students understand the process, they can practice independently using gameboards, construction paper squares, and problem cards. At this level the students match a problem card to each gameboard and perform the operation specified.

ACTIVITY 2 - OUTCOMES 2 and 3

Enclose 3, 4, 5, or 6 beads, marbles, rocks, or counters inside a small ziplock bag. Seal and tape. The students rearrange the beads within the bag by pushing some into the corners. Discuss how the grouping may vary but the total remains constant.

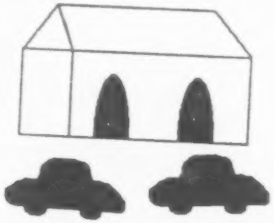
Example:



ACTIVITY 3 - OUTCOMES 2 and 3

Sets of small plastic toys may be used for a number of grouping games. Simple gameboards and record sheets may be used. Have students count out five toy cars. Using the set of cars, ask the students how many ways the cars can be placed inside/outside the garage?

Example:



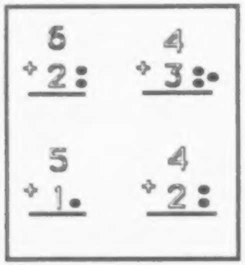
Let students write each number sentence.

Example: 3 + 2 = 5

ACTIVITY 4 - OUTCOMES 4 and 5

Give the children a ditto sheet such as the following and teach them to "count on" to determine the totals. This ditto sheet should have the smaller numbers on the bottom. (A full explanation of "counting on" is given in Activity 7.)

Example:



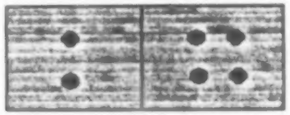
6 + 2:	4 + 3:•
5 + 1•	4 + 2:

Explanation: Have students begin at 6 and "count on" 2 more. 6 7 8 or 6 + 2 = 8

ACTIVITY 5 - OUTCOMES 3 and 4

Let students use dominoes to solve basic addition problems.

Example:



= 6

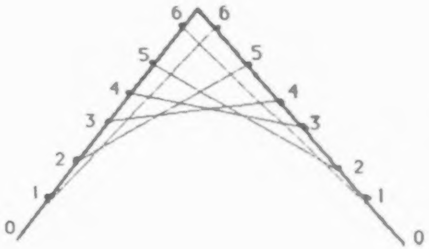
Have students write the number sentence 2 + 4 = 6.

ACTIVITY 6 - OUTCOME 5

Draw two straight lines at an angle on cardboard. Divide the lines into equal divisions. Punch holes at each division and number as shown below. Separate laces are threaded through each of the holes on one side and knotted at the back. The child joins a pair of numbers with each lace to make the desired total.

Example:

Join pairs for sets of "7"

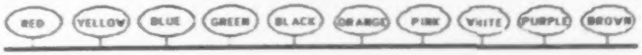


ACTIVITY 7 - OUTCOME 6

Before attempting number line work, plenty of ordering number activities should be used. A color line may precede a number line. The color line will give practice in counting the moves in either direction.

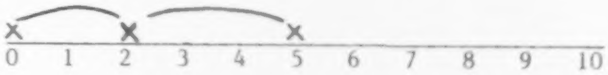
A color line is a straight line marked into ten equal intervals on a piece of cardboard. Draw and color a different circle at the top of each mark. The student uses a cube or counter to move along the line from one point to another. The teacher gives verbal directions. "Put your counter on the green circle. Now move three spaces to the right. What color is the counter on?"

Example:



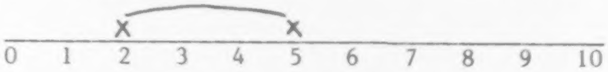
Progress to a number line. The teacher may give instructions to start at zero and count on 2. Then instruct students to count on three more.

2 + 3 = 5



Repeat this process beginning at points other than zero. Tell students to put a finger on 2 and count on 3.

2 + 3 = 5

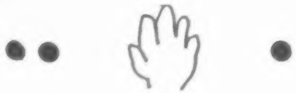


This process of beginning at a given addend and counting a specified number designated by the second addend to reach a sum is called "counting on."

ACTIVITY 8 - OUTCOME 5

Students line up a specified number of beans on their desks. Tell them to use one hand to divide the group of beans into two groups.

Example:



What number sentence can we make? 2 + 1 = 3

AREA: ADDITION

OUTCOMES:
7. Add three one-digit addends.
8. Add three addends of no more than two digits.
9. Add more than three addends.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Understand the value of numbers.
2. Understand the process of addition.

Steps to Success

1. Students will need repeated experiences to understand this skill.
2. Review two-digit addition.

ACTIVITY 1 - OUTCOME 7

Draw a tree with branches on a large piece of paper and place it on the floor. Have students act as birds. Let two students perch on one branch, one student on another branch and three students on a third branch. Write the number of birds (students) perched on each branch on the chalkboard.

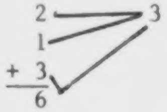
Example:

$$\begin{array}{r} 2 \\ 1 \\ \underline{+\ 3} \end{array}$$

ACTIVITY 1 - OUTCOME 7 (Cont´d)

Go through the steps of adding the three numbers, adding two numbers at a time.

Example:



As two numbers are added, allow the birds (students) to move to the appropriate branch until all six birds are on the same branch.

ACTIVITY 2 - OUTCOMES 7 and 8

Thread one red, two yellow, and four green beads on a string. Hold them up for the students to add. Four plus two equals six, six plus one equals seven. Write the problem on the chalkboard. Repeat this procedure with various numbers and colors. Provide the students with the opportunity to use the beads and make up their own addition problems and answer them.

ACTIVITY 3 - OUTCOMES 7 and 8

At a learning center have colored beads, blocks, or clothespins available for the students to use. Have teacher-made cards with problems using 3 addends. Provide the students with an answer sheet and have them use any of the resources, described above to solve the problem.

ACTIVITY 4 - OUTCOMES 7, 8, and 9

Write the following problem on the chalkboard:

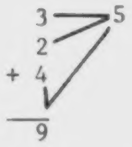
Example:

$$\begin{array}{r} 3 \\ +\ 2 \\ 4 \\ \hline \end{array}$$

ACTIVITY 4 - OUTCOMES 7, 8, and 9 (Cont'd)

Students can already add two one-digit addends so let's change this problem into two problems students can already do.

Example:



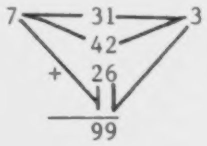
Add 3 + 2 to get 5

Now, add 5 and the remaining addend (4) to get a final sum of 9

(In our example we have added the two top numbers first. Give students an opportunity to add the bottom numbers first or the bottom and top numbers first. This can help illustrate the commutative and associative properties of addition.)

* This same process can be used to teach Outcome 8.

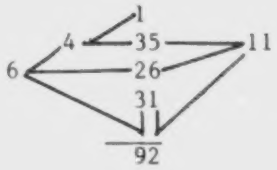
Example: No regrouping



Add 1 and 2 to get 3
Now, add 3 and 6 to get 9
Place the 9 in the ones column

Add 3 tens and 4 tens to get 7 tens
Now, add 7 tens and 2 tens to get 9 tens.
Place the 9 tens in the tens column.

Example: Regrouping



Add 5 and 6 to get 11
Then, add 11 and 1 to get 12
Place the 2 in the ones column and carry the one ten.

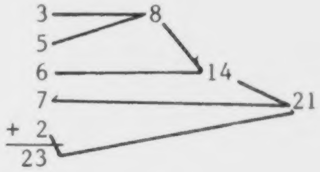
Add the 1 ten and 3 tens to get 4 tens
Add 4 tens to 2 tens to get 6 tens
Now, add 6 tens to 3 tens to get 9 tens
Place the 9 tens in the tens column and the final sum is 92.

ACTIVITY 4 - OUTCOMES 7, 8, and 9 (Cont'd)

Students should be given practice at each stage of three-digit addition to ensure success.

When adding more than three addends the same process can be used.

Example:



By this time some students may be experimenting with different strategies to solve these problems. Encourage the use of new strategies, but ask questions to ensure understanding.

AREA: ADDITION

OUTCOMES: 10. Use various methods to check addition problems.
11. Locate calculation errors in addition problems.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Add basic facts.
2. Use the commutative and associative properties of addition.

Steps for Success

In order for students to check their work for possible errors, they should see the need for doing so. Checking the solution should become part of the process for finding the answer to any computation problem.

ACTIVITY 1 - OUTCOME 10

Refer to Addition Outcomes 18, 19 - Activities 4 and 5.

ACTIVITY 2 - OUTCOME 11

Give each student a handout with the following problems:

$$\begin{array}{r} 5 \\ 3 \\ +\ 6 \\ \hline 14 \end{array} \qquad \begin{array}{r} 4 \\ 2 \\ +\ 5 \\ \hline 12 \end{array} \qquad \begin{array}{r} 6 \\ 6 \\ +\ 6 \\ \hline 15 \end{array} \qquad \begin{array}{r} 3 \\ 1 \\ +\ 2 \\ \hline 6 \end{array} \qquad \begin{array}{r} 3 \\ 6 \\ +\ 6 \\ \hline 15 \end{array}$$

ACTIVITY 2 - OUTCOME 11 (Cont´d)

Students will have an opportunity to be the teacher and check each problem for the correct answer. To do this they need to add each problem to check for the right sums. If they find an incorrect answer they should circle the wrong answer and place the correct answer under it.

Example:

5	4	6	3	3
3	2	6	1	6
+ 6	+ 5	+ 6	+ 2	+ 6
14 ✓	⑫	⑮	6 ✓	15 ✓
	11	18		

MATHEMATICS
K - 3

AREA: ADDITION

OUTCOMES: **12. Solve two- and three-digit problems to 999 with no regrouping.**
13. Solve two- and three-digit problems to 1000 with regrouping.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Understand place value.

Steps for Success

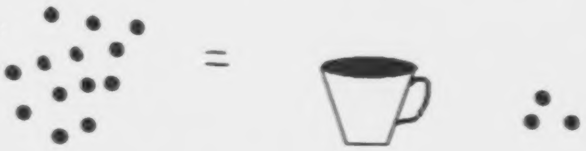
1. Teach addition and subtraction together.
2. When students are given a problem such as $\begin{array}{r} 23 \\ +\ 14 \\ \hline \end{array}$, they should see the problem as $\begin{array}{r} 20 \\ +\ 10 \\ \hline \end{array}$ and $\begin{array}{r} 3 \\ +\ 4 \\ \hline \end{array}$.

   They should not look at $\begin{array}{r} 23 \\ +\ 14 \\ \hline \end{array}$ as $\begin{array}{r} 2 \\ +\ 1 \\ \hline \end{array}$ and $\begin{array}{r} 3. \\ +\ 4 \\ \hline \end{array}$
3. Regrouping should be taught first. If children understand the process of regrouping and why it´s needed, they will not be confused by any of the later steps.

ACTIVITY 1 - OUTCOMES 12 and 13

Take a handful of beans and make as many tens as possible. Place each set of ten beans in a paper cup.

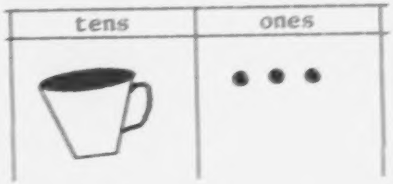
Example:



ACTIVITY 1 - OUTCOMES 12 and 13 (Cont'd)

Place the beans on the following chart and write the corresponding numeral.

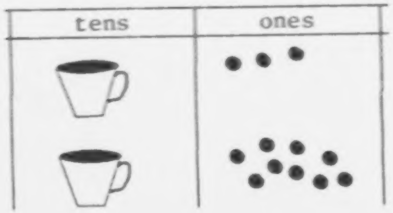
Example:



tens	ones
1	3

Count out a 2nd handful of beans and place them on the chart.

Example:

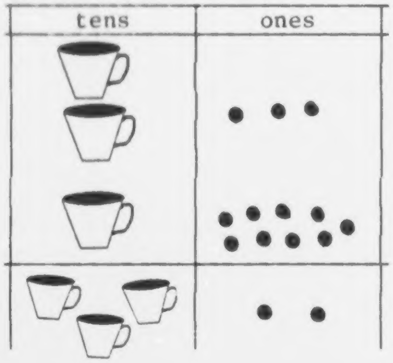


tens	ones
1	3
1	9

Combine the beans in the ones column and put ten beans in another paper cup if necessary. Place the cup of ten beans in the tens column. Add the number of cups in the tens column and write the answer. Now add the number of leftover beans in the ones column and write the answer.

ACTIVITY 1 - OUTCOMES 12 and 13 (Cont´d)

Example:



tens	ones
1	
1	3
1	9
3	2

We have a total of 32 beans.

This process can be used to show addition with regrouping or no regrouping of two or three-digit numbers.

MATHEMATICS
K - 3

AREA: ADDITION

OUTCOMES:
14. Identify a number sentence appropriate to solving an addition problem.
15. Write a number sentence from a vertical addition problem.
16. Write a number sentence from a story problem.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Have an understanding of quantity, number combinations, and number relationships.
2. Name or write the numeral for a given set.

Steps to Success

1. Help students relate real experiences with the symbols that represent those experiences.

ACTIVITY 1 - OUTCOME 14

Prepare a teacher-made worksheet with various number sentences written in each square. Students will need to listen for important number clues. The students will circle only one number sentence in each square and then answer the circled number sentence. Repeat the process, using a variety of math problems, until students have learned to listen for the needed numbers.

ACTIVITY 1 - OUTCOME 14 (Cont´d)

Example:

1. 1 + 3 = 5 + 4 = 6 + 3 = 9	2. 4 + 2 = 6 5 + 1 = 6 + 4 =
3. 3 + 9 = 7 + 0 = 8 + 1 =	4. 4 + 3 = 4 + 9 = 5 + 6 =

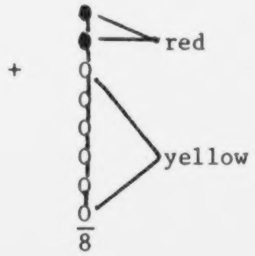
1. 6 flowers in the pig´s yard. 3 flowers in the chicken yard. How many in all?
2. 4 trees in the pig´s yard. 2 trees in the chicken yard. How many in all?

ACTIVITY 2 - OUTCOME 15

Use colored beads on a string or wire to illustrate a vertical problem. Write the problem on the chalkboard.

Example:

$$\begin{array}{r} 2 \\ +\ 6 \\ \hline 8 \end{array}$$



red yellow

Count the beads and write the answer on the board. Hold the beads horizontally ●-●-0-0-0-0-0-0 and write the number sentence 2 + 6 = $\square$ on the board. Count the beads and write the answer. Continue with several more examples.

ACTIVITY 3 - OUTCOME 16

Read a story problem to the class. Ask students to write a number sentence for the story problem. Ask a student to write his equation and answer on the chalkboard and discuss it.

This needs to be a frequent activity so students can become proficient with this skill.

AREA: ADDITION

OUTCOMES: 17. Name the sum when zero is an addend.
18. Name the missing addend in an addition sentence in which the addends have been regrouped.
19. Name the missing addend in an addition sentence in which the addends have been reordered.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Have concrete experiences with addition.
2. Have experience in working with three addends.

Steps to Success

1. Provide many opportunities for students to understand the concepts.

ACTIVITY 1 - OUTCOME 17

Explain that zero is the identity element for addition. The sum of any number and zero is always that number. Use beads, wooden blocks, macaroni shells, etc. to illustrate this. With the aid of concrete materials, allow students ample time to try problems using 0 as an addend.

ACTIVITY 2 - OUTCOME 19

Draw a number line on the floor (or use masking tape). Select a student to stand on the number 0, and take two steps forward. Record the numeral 2 on the chalkboard. Have the student take three more steps and record the numeral 3. Next, have the student take four more steps and record the numeral 4. Finally, record the numeral 9, indicating the place where the student stopped (2 + 3 + 4 = 9). Ask another student to take four steps and record the numeral 4 on the chalkboard. Then have the student take three more steps and record the numeral 3. Have the student take two more steps and record the numeral 2. Finally, record the numeral 9. On the chalkboard the following problems should be written

$$2 + 3 + 4 = 9$$
$$4 + 3 + 2 = 9$$

Point out to the students that both problems include the same numbers so the order in which they are added makes no difference. Both problems have the same answer.

ACTIVITY 3 - OUTCOME 18

Use a geoboard with colored rubber bands to illustrate the associate property. Have students put a green rubber band around a set of three nails, a red rubber band around a set of two nails, and a blue rubber band around a set of four nails. No rubber bands should cross each other. Place a large brown rubber band around the nails enclosed by the green and red rubber bands. Explain to the students that the nails and rubber bands represent the following problem:

$$(3 + 2) + 4 = 9$$

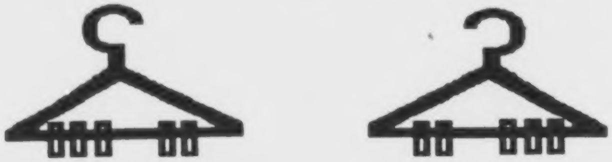
Now remove the brown rubber band and place it around the nails enclosed by the red and blue rubber bands. Now the nails and rubber bands represent the following problems:

$$3 + (2 + 4) = 9$$

The nails have been regrouped but have the same answer.

ACTIVITY 4 - OUTCOME 19

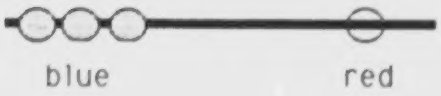
To illustrate the commutative property of addition use clothespins and a clothes hanger. Have a student place three and then two clothespins on the hanger to model 3 + 2 = ☐.

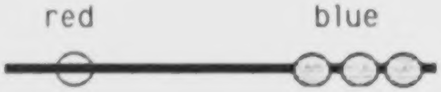


Have a child count the total number of the clothespins on the hanger. Rotate the hanger so the clothespins are reversed. Have students recognize that 2 + 3 = ☐ is now showing. Again, have students count the clothespins on the hanger. Lead the students to the conclusion that 3 + 2 = 5 and 2 + 3 = 5. The numbers in an addition problem can be reordered and still have the same totals.

ACTIVITY 5 - OUTCOME 19

Use colored beads on a string or wire to illustrate a math problem 3 + 1 = ☐. Count the beads and write the answer on the board. Reverse the string so the children can see 1 + 3 = ☐. Count the beads and write the answer. The numbers in an addition problem can be reordered and have the same sum.





MATHEMATICS
K - 3

AREA: ADDITION

OUTCOMES:
7. Add three one-digit addends.
8. Add three addends of no more than two digits.
9. Add more than three addends.
10. Use various methods to check addition problems.
12. Solve two and three-digit problems to 999 with no regrouping.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know how to load, boot, and operate a computer assisted instructional package.

Steps to Success

1. The teacher should have basic computer skills or access to someone who does.
2. The teacher must have access to at least four computers and appropriate computer software.
3. The following activity can be used in grades 1-3. The teacher must select the software appropriate to the grade level of the students. For example:

Grade 1 - MECC disk #788 EARLY ADDITION
Grade 2 - MECC disk #788 EARLY ADDITION
MECC disk #109 CIRCUS MATH
Grade 3 - MECC disk #109 CIRCUS MATH
MECC disk #125 ADDITION LOGITION

DO NOT USE ANY SOFTWARE UNLESS YOU HAVE REVIEWED IT! Make sure the software meets the needs of your students and pay attention to the time it takes to finish the assignment.

Steps to Success (Cont´d)

4. It is very important that students are given all the "rules" for using the computers: Spend time letting them get used to the equipment before attempting any CAI activity. This will not take long. After 30 minutes of "discovery" time on the keyboard, most students feel comfortable.
5. If students are not accustomed to group work, it will take a few sessions to get the "bugs" worked out. Students tend to depend a great deal on the teacher, but encourage them to be more independent and responsible for their own work. Don´t give up if things are hectic the first time.
6. Do not expect this to be a quiet activity. It will not be. Maintain order, but remember this is an ACTIVE-ity.
7. The teacher´s role should be one of helper/facilitator. With more than three groups, this role is difficult to manage. If there are aides or parent volunteers available, use them.

ACTIVITY 1 - OUTCOMES 7, 8, 9, 10, and 12

Use a computer and a math worksheet generator software package to generate an addition worksheet. (If MECC materials are available, use MECC disk #151 - MASTERING MATH WORKSHEET GENERATOR.) The worksheet should complement the activities and the concept covered by the software package. For example, the MECC MATH WORKSHEET GENERATOR is pre-programmed to generate worksheets that complement EARLY ADDITION, CIRCUS MATH, and ADDITION LOGITION. It can also generate customized worksheets. Keep in mind that the workshops should require the same amount of time to complete as the software assignment. You may want to generate more than one worksheet. Two short worksheets might be better than one long one for maintaining interest.

Divide students into groups. The number of students in each group should be equal to or less than the number of computers available. Assign the computer activity to one group and the worksheet to another group. If there are more than two groups, select additional activities from this section or design additional activities so that each group has a different activity. The activities should require minimal teacher involvement, address the same objectives, and match the time requirement of the software. Choose activities carefully.

Set a time limit that is appropriate for the particular computer software selected and tell the students that they must rotate groups at the end of the time limit. The time limit might be 15 minutes or 30 minutes, depending on the age of the students and the activity selected.

The MECC MANAGEMENT SYSTEM (disk #150) can be used with EARLY ADDITION, ADDITION LOGITION, and CIRCUS MATH to keep a record of student progress. These programs are a part of the MECC MASTERING MATH series. Refer to the manual or disk #150 for information on how to use the management and diagnostic systems in this series. The students´ disks can be used with or without these teacher utilities.

MATHEMATICS
K - 3

AREA: SUBTRACTION

OUTCOMES:
1. Verbalize the subtraction process by taking objects away from a set.
2. Use manipulatives to solve simple story problems.
3. Solve problems with minuends not to exceed 18.
4. Illustrate the subtraction process using a number line.
5. Write subtraction sentences after hearing or reading simple subtraction problems.
6. Solve problems with zero as the subtrahend.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know number concepts 0-9.
2. Know order of numbers 0-9.
3. Have instant recognition of small groups.

Steps for Success

1. Addition and subtraction are taught together as processes.
2. Many of the addition activities described may be used for subtraction. Spend several days on a particular addition activity or groups of activities. Follow-up with similar subtraction activities.

ACTIVITY 1 - OUTCOMES 1 and 2

Call 6 students to the front to be sorted into two categories. The two categories are students wearing tie shoes and students wearing shoes that do not tie. Ask the following questions and record the equation on the chalkboard.

How many students are in this group?
Class response: 6 students

Everyone with shoes that don't tie sit down.
How many students sat down?
Class response: 2 students

How many students are still standing?
Class response: 4 students

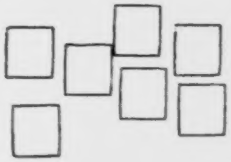
6 - 2 = 4

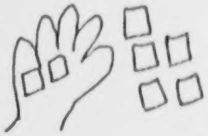
ACTIVITY 2 - OUTCOMES 1, 2, and 3

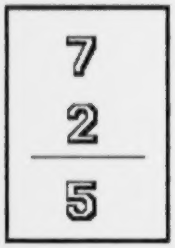
Give these directions:

1. Take a handful of counters out of your box. (tiles, buttons, beans etc.)
2. Count how many you have and write the number at the top of your paper.
3. Take some away from the pile. Put them in your hand and count them.
4. Write that number underneath the first number.
5. Put those counters back in your box. Draw a line under the two numbers. Write how many you have left.

Example:







ACTIVITY 2 - OUTCOMES 1, 2, and 3 (Cont´d)

6. Ask the students to explain their problems to the class.

ACTIVITY 3 - OUTCOME 4

Refer to Addition, Activity 9. Use the color line first, moving in both directions. Discuss the reverse procedure for subtraction.

ACTIVITY 4 - OUTCOME 5

Mary, take these five books and stand here. How many books does she have?

Bill, take three of Mary´s books and put them back on the shelf. How many books did Bill put back? How many books are in Mary´s stack now?

Students decide what numbers to write.

ACTIVITY 5 - OUTCOME 6

Use students to illustrate the role of zero as the subtrahend in subtraction. Ask the class to generalize the procedure and state a "rule."

Example:

Have 5 girls go to the front of the room. Ask that no girls sit down. How many girls remained standing?

By asking No girls to sit down, zero is being subtracted. What do you think happens to a number when zero is subtracted?

MATHEMATICS
K - 3

AREA: SUBTRACTION

OUTCOMES:
7. Use addition to check answers to completed subtraction problems.
8. Locate calculation errors in subtraction problems.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Add and subtract whole numbers.

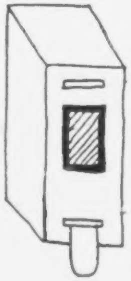
Steps to Success

1. Addition and subtraction are taught together as processes.

ACTIVITY 1 - OUTCOME 7

In a learning center, prepare four to five shoe box computers. Prepare several cards with a subtraction problem on the front and the addition problem to check the subtraction on the back. Let students try checking the answers using addition. To check for correct answers have students place the front of the card which shows the subtraction problem in the top slot. The card slides out of the bottom slot showing the addition problem to check the subtraction.

Example:



135

Directions for making shoe box computers

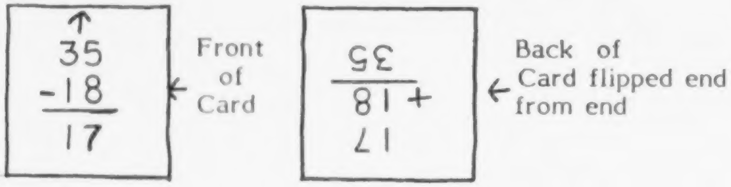
Cut 2 slots (approximately $\frac{1}{2}$" x 3 $\frac{1}{2}$") on the top and bottom of a shoe box lid. Cut a piece of poster board 3 $\frac{1}{2}$" x 14" in this shape - and tape it above the top slot. Let the curved portion stick out from the bottom slot.

136

ACTIVITY 1 - OUTCOME 7 (Cont´d)

Example: (Cont´d)

The 3" x 5" index cards should be prepared in the following way:



ACTIVITY 2 - OUTCOME 7

Place cards with completed subtraction problems in a box. Have a student select a card from the box and write in an addition problem to check the subtraction.

For variations of this activity, the box and cards can be decorated using a seasonal theme.

Examples:

Halloween	- a trick or treat bag with problems on ghost-shaped cards;
Christmas	- a gift box with problems on tree-shaped cards;
Valentine Day	- a Valentine box with problems on heart-shaped cards;
Easter	- an Easter basket with problems on egg-shaped cards.

ACTIVITY 3 - OUTCOME 7

Give each student a handout with the following problems:

$\begin{array}{r} 45 \\ -\ \underline{23} \\ \end{array} \quad \begin{array}{r} \\ +\ \underline{} \\ 45 \end{array}$	$\begin{array}{r} 59 \\ -\ \underline{4} \\ \end{array} \quad \begin{array}{r} \\ +\ \underline{} \\ 59 \end{array}$	$\begin{array}{r} 63 \\ -\ \underline{17} \\ 46 \end{array} \quad \begin{array}{r} \\ +\ \underline{} \\ 63 \end{array}$	$\begin{array}{r} 70 \\ -\ \underline{36} \\ 34 \end{array} \quad \begin{array}{r} \\ +\ \underline{} \\ 70 \end{array}$

Students solve the problems and show the addition used to check the answers.

ACTIVITY 4 - OUTCOME 8

Three subtraction problems are written on the chalkboard. Answers are provided but one problem is incorrect. Students check to find the incorrect answer. They should give the correct solution.

Example: Which one is incorrect?

$$\begin{array}{r} 42 \\ -\ \underline{21} \\ 21 \end{array} \qquad \begin{array}{r} 57 \\ -\ \underline{33} \\ 23 \end{array} \qquad \begin{array}{r} 63 \\ -\ \underline{38} \\ 25 \end{array}$$

MATHEMATICS
K - 3

AREA: SUBTRACTION

OUTCOMES:
9. Solve subtraction problems involving one-, two-, and/or three-digit numbers without regrouping.
10. Solve subtraction problems involving one-, two-, and/or three-digit numbers with minuends to 100, 1000 with regrouping.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know the basic facts of addition and subtraction.

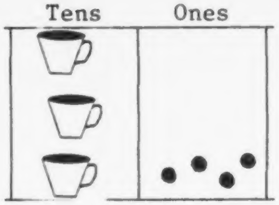
Steps to Success

1. Be prepared to allow children TIME to understand the concepts of addition and subtraction.
2. Teaching no regrouping exclusively before grouping leads to misconceptions that take years to "unlearn."
3. Regrouping and no regrouping are taught together. Regrouping can actually be taught first. Be sure to introduce regrouping with counters.
4. Provide many manipulative experiences emphasizing the processes of addition and subtraction, including basic word problems.

ACTIVITY 1 - OUTCOMES 9 and 10

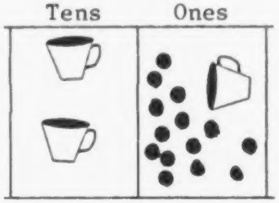
Give each child a tens/ones place value board and a large number of beans. Ten beans will be placed in a paper cup to represent one ten. Write a number on the board for students to represent on their boards.

Example: 34



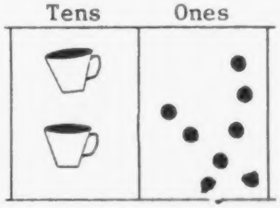
Ask students to remove 26 beans from the chart. Begin by subtracting 6 beans from the ones column. Explain that a cup of ten beans must be borrowed from the tens column to enable students to subtract 6 beans.

Example:



Now subtract 6 beans from the ones column.

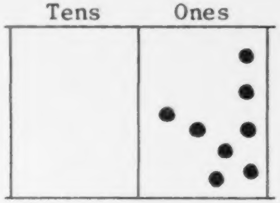
Example:



ACTIVITY 1 - OUTCOMES 9 and 10 (Cont´d)

Now subtract 2 tens.

Example:



34 - 26 = 8

Provide students several problems that require regrouping before writing symbols for any problems.

Demonstrate the regrouping process using symbols.

Example:

$$\begin{array}{r} 214 \\ \cancel{3}\cancel{4} \\ -\ 26 \\ \hline 08 \end{array}$$

Introduce three-digit subtraction using beads of 100´s, 10´s, 1´s.

ACTIVITY 2 - OUTCOMES 9 and 10

Get To Zero Game. Play a subtraction game with 2 or 3 students. Use three dice. Give each player a sheet of paper with the player´s name and the number 999.

Sue	Bill	Bob
999	999	999
- 354	- 123	- 256
645	876	743

ACTIVITY 2 - OUTCOMES 9 and 10 (Cont'd)

1. Players take turns rolling 3 dice. They may arrange the 3 numbers in any order - (354, 453, 543) and subtract from 999.
2. Continue playing, with each player trying to get to zero.
3. Optional-use 1 or 2 dice at any point in the game. If the number left is too small to subtract, the next player plays.

ACTIVITY 3 - OUTCOMES 9 and 10

Double and Subtract Game - Two players begin with 1000 and try to get to zero.

1. 1st player subtracts any three-digit number from 1000.
2. 2nd player may subtract up to twice what the 1st player subtracted but may subtract less if he chooses.
3. 1st player may subtract up to twice what the 2nd player subtracted, etc.
4. Players continue to subtract until a player subtracts and has a difference of zero (0).

Example:

$$\begin{array}{r} 1000 \\ -\ 100 \\ \hline 900 \\ -\ 200 \\ \hline 700 \\ -\ 400 \\ \hline 300 \\ -\ 300 \\ \hline 0 \end{array} \text{ Winner}$$

147

148

MATHEMATICS
K - 3

AREA: SUBTRACTION

OUTCOMES:

3. Solve problems with minuends not to exceed 18.
6. Solve problems with zero as the subtrahend
9. Solve subtraction problems involving one-, two-, and/or three-digit numbers without regrouping.
10. Solve subtraction problems involving one-, two-, and/or three-digit numbers with minuends to 100, 1000, regrouping.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know how to load, boot, and operate a computer assisted instructional package.

Steps to Success

1. The teacher should have basic computer skills or access to someone who does.
2. The teacher must have access to at least four computers and appropriate computer software.
3. The following activity can be used in grades 1-3. The teacher must select the software appropriate to the grade level of the students. For example:

Grade 1 - MECC disk #145 SPACE SUBTRACTION
MECC disk #162 PATH TACTICS
MECC disk #169 SPEEDWAY MATH

Grade 2 - MECC disk #145 SPACE SUBTRACTION
MECC disk #162 PATH TACTICS
MECC disk #169 SPEEDWAY MATH

Grade 3 - MECC disk #145 SPACE SUBTRACTION
MECC disk #146 SUBTRACTION PUZZLES
MECC disk #162 PATH TACTICS
MECC disk #169 SPEEDWAY MATH

Steps to Success (Cont´d)

DO NOT USE ANY SOFTWARE UNLESS YOU HAVE REVIEWED IT! Make sure that the software fits the needs of your students and pay attention to the time it takes to finish the assignment.

4. It is very important that students are given all the "rules" for using the computers. Spend time letting them get used to the equipment before attempting any CAI activity. This will not take long. After 30 minutes of "discovery" time on the keyboard, most students feel comfortable.
5. If students are not accustomed to group work, it will take a few sessions to get the "bugs" worked out. Students tend to depend a great deal on the teacher, but encourage them to be more independent and responsible for their own work. Don´t give up if things are hectic the first time.
6. Do not expect this to be a quiet activity. It will not be. Maintain order, but remember this is an ACTIVE-ity.
7. The teachers role should be one of helper/facilitator. With more than three groups, this role is difficult to manage. If there are aids or parent volunteers available, use them.

ACTIVITY 1 - OUTCOMES 3, 6, 9, and 10

Use a computer and a math worksheet generator software package to generate a subtraction worksheet. (If MECC materials are available, use MECC disk #151 - MASTERING MATH WORKSHEET GENERATOR.) The worksheet should complement the activities and concepts covered by the software package. For example, the MECC MATH WORKSHEET GENERATOR is pre-programmed to generate worksheets that complement SPACE SUBTRACTION and SUBTRACTION PUZZLES. It can also generate customized worksheets. Keep in mind that the worksheets should require the same amount of time to complete as the software assignment. You may want to generate more than one worksheet. Two short worksheets might be better than one long one for maintaining interest.

Divide students into groups. The number of students in each group should be equal to or less than the number of computers available. Assign the computer activity to one group and the worksheet to another group. If there are more than two groups, select additional activities from this section or design additional activities so that each group has a different activity. The activities should require minimal teacher involvement, address the same objectives, and match the time requirement of the software. Choose the activities carefully.

ACTIVITY 1 - OUTCOMES 3, 6, 9, and 10 (Cont´d)

Set a time limit that is appropriate for the particular computer software selected, and tell the students that they must rotate groups at the end of the time limit. The time limit might be 15 minutes or 30 minutes, depending on the age of the students and the activity selected.

The MECC MANAGEMENT SYSTEM (disk #150) can be used with SPACE SUBTRACTION and SUBTRACTION PUZZLES to keep a record of student progress. These programs are a part of the MECC MASTERING MATH series. Refer to the manual or disk #150 for information on how to use the management and diagnostic systems in this series. The students´ disks can be used with or without these teacher utilities.

MATHEMATICS
K - 3

AREA: MULTIPLICATION

OUTCOMES:
1. Name the product when zero (0) or one (1) is used as a multiplier.
2. Name the missing factor in a multiplication problem in which the factors have been reordered or regrouped.
3. Demonstrate an understanding of basic multiplication facts.
4. Multiply using multipliers of one-digit and multiplicands of two-digits, three-digits.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Count groups of equal number.
2. Know basic addition facts.
3. Understand place value

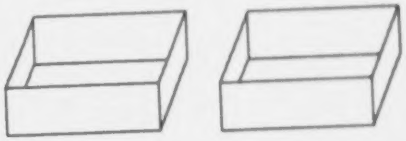
Steps for Success

1. Students should be introduced to multiplication by using concrete objects.

ACTIVITY 1 - OUTCOME 1

Develop the zero property of multiplication by using empty boxes. Each box can represent a set.

Example: 2 sets of 0 = 0 2 x 0 = 0



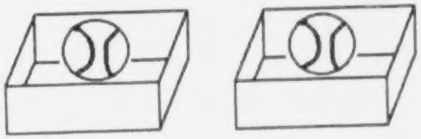
155

156

ACTIVITY 1 - OUTCOME 1 (Cont´d)

Then place a third box with the other two. The children should write 3 x 0 = 0. Continue until children can generalize that any number multiplied by zero is zero.

Variation: Use the same activity using one as a factor.
2 sets of one = two   2 x 1 = 2

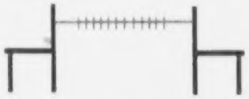


ACTIVITY 2 - OUTCOME 1

Distribute several cups and beans to each student in the class. Have students put 3 cups side by side. Have students put one bean in each cup. Write the equation 3 x 1 = 3 on the board. Have students put away all but one cup and place three beans in that cup. Have the students write the equation 1 x 3 = 3.

ACTIVITY 3 - OUTCOME 3

String wheel macaroni on a string about 4 feet long. Tie the string between two chairs.



There are twelve macaroni wheels on the string. How many sets of four can be made? Begin by having a student count a set of four and clip on a clothespin; then count another set of four, etc.

4 x 3 = 12

You can dye the macaroni shells by putting 2 tbls. of alcohol with several drops of a selected food coloring into a quart jar filled with water. Add macaroni and gently shake.

ACTIVITY 4 - OUTCOMES 3 and 4

Use pennies, checkers, or counting blocks to make arrays on the overhead projector. As an array is made have students write the multiplication fact on their papers.

Extension: Give the students a multiplication fact and have them draw an array.

ACTIVITY 5 - OUTCOMES 2 and 3

Give each student a card with a 3 x 3 grid. Have students write the multiples for a designated number on their cards. Students choose and place multiples randomly so that each gameboard is different. Call out factors and have the students cover the correct answer. The first person to answer three in a row correctly wins.

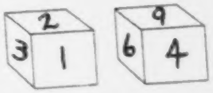
Example: Multiples of 3

33	12	27
6	9	21
15	24	36

ACTIVITY 6 - OUTCOME 4

Make two blocks with numbers on each face. Two players take turns rolling the blocks. The players write down and multiply the numbers that turn up. After 3 turns each they total their scores. High score wins.

Example:

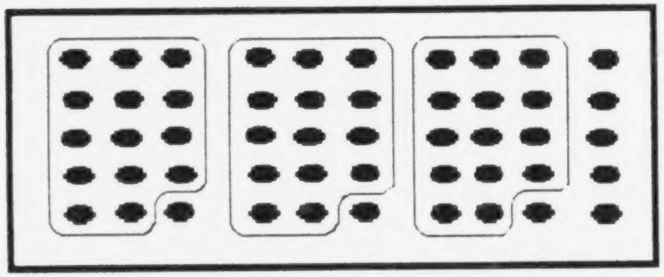


2 x 9 = 18

ACTIVITY 7 - OUTCOME 4

Distribute dot paper to each student to introduce multiplication of a two-digit number times a one-digit number (For example: 3 x 14). Have students circle three sets of 14 dots and count the dots.

Example: 3 x 14 = 48



ACTIVITY 8 - OUTCOME 4

When multiplying a two-digit or three-digit number by a one-digit number, students need to understand the process of multiplication before the standard multiplication algorithm is taught.

Write the following problem on the chalkboard:

$$\text{Example: } \begin{array}{r} 32 \\ \underline{\times\ 3} \end{array}$$

Write 32 in expanded form

$$\text{Example: } \begin{array}{r} 32 \\ \underline{\times\ 3} \end{array} \quad = \quad \begin{array}{r} 30 + 2 \\ \underline{\times \quad\ 3} \end{array}$$

ACTIVITY 8 - OUTCOME 4 (Cont´d)

Multiply 2 x 3 then 30 x 3

Example: $$\begin{array}{r} 32 \\ \underline{\times\ 3} \end{array} \quad = \quad \begin{array}{r} 30 + 2 \\ \underline{\times \qquad 3} \\ 90 + 6 \end{array}$$

Add 90 + 6 to get 96

Example: $$\begin{array}{r} 32 \\ \underline{\times\ 3} \end{array} \quad = \quad \begin{array}{r} 30 + 2 \\ \underline{\times \qquad 3} \\ 90 + 6 \\ 96 \end{array}$$

This process not only breaks down the multiplication algorithm into parts but gives students an understanding of the importance of place value in the multiplication process.

Once students understand place value´s role in solving a multiplication problem the short algorithm can be taught.

Example: $$\begin{array}{r} 32 \\ \underline{\times\ 3} \\ 96 \end{array}$$

ACTIVITY 9 - OUTCOME 4

Regrouping

If students understand regrouping in addition problems they should be able to regroup when solving multiplication problems. Regrouping may be introduced in the same way as in ACTIVITY 8. If the students are ready you may chose to introduce regrouping in the following manner.

ACTIVITY 9 - OUTCOME 4 (Cont´d)

Write the following problem and place value grid on the chalkboard.

Example:

100's	10's	1's
	3	
	1	6
	X	6
	9	6

Step 1
Multiply 6 x 6 ones to get 36. 36 is made of 3 tens and 6 ones.
Place the 6 ones in the ones answer column.
Place the 3 tens at the top of the tens column.

Step 2
Multiply 6 x 1 ten to get 6 tens. Add the regrouped 3 tens to the 6 tens to get 9 tens.
Place the 9 tens in the tens answer column.

Your final answer is 9 tens and 6 ones or 96.

Give students practice in working the multiplication algorithm. It is extremely important that students explain orally the process they have used in solving problems. By doing this the students can show how well they understand the algorithm. By listening the teacher can see where possible problems may exist.

The same procedures may be used when teaching problems involving a one-digit multiplier and a three-digit multiplicand.

MATHEMATICS
K - 3

AREA: MULTIPLICATION

OUTCOME: 4. Multiplying using multipliers of one-digit and multiplicands of two-digits, three-digits.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know how to load, boot, and operate a computer assisted instructional package.

Steps to Success

1. The teacher should have basic computer skills or access to someone who does.
2. The teacher must have access to at least four computers and appropriate computer software. For example:

   MECC disk # 147 - MULTIPLICATION PUZZLES
   MECC disk # 162 - PATH TACTICS

   DO NOT USE ANY SOFTWARE UNLESS YOU HAVE REVIEWED IT! Make sure that the software fits the needs of your students and pay attention to the time it takes to finish the assignment.

4. It is very important that students are given all the "rules" for using the computers. Spend time letting them get used to the equipment before attempting any CAI activity. This will not take long. After 30 minutes of "discovery" time on the keyboard, most students feel comfortable.
5. If students are not accustomed to group work, it will take a few sessions to get the "bugs" worked out. Students tend to depend a great deal on the teacher, but encourage them to be more independent and responsible for their own work. Don´t give up if things are hectic the first time.
6. Do not expect this to be a quiet activity. It will not be. Maintain order, but remember this is an ACTIVE-ity.
7. The teacher´s role should be one of helper/facilitator. With more than three groups, this role is difficult to manage. If there are aides or parent volunteers available, use them.

ACTIVITY 1 - OUTCOME 4

Use a computer and a math worksheet generator software package to generate a Multiplication worksheet. (If MECC materials are available use MECC disk #151 - MASTERING MATH WORKSHEET GENERATOR.) The worksheet should complement the activities and concepts covered by the software package. For example, the MECC MATH WORKSHEET GENERATOR is pre-programmed to generate worksheets that complement MULTIPLICATION PUZZLES. It can also generate customized worksheets. Keep in mind that the worksheets should require the same amount of time to complete as the software assignment. You may want to generate more than one worksheet. Two short worksheets might be better that one long one for maintaining interest.

Divide students into groups. The number of students in each group should be equal to or less than the number of computers available. Assign the computer activity to one group and the worksheet to another group. If there are more than two groups, select additional activities from this section or design additional activities so that each group has a different activity. The activities should require minimal teacher involvement, address the same objectives and match the time requirement of the software, so choose carefully.

Set a time limit that is appropriate for the particular computer software selected, and tell the students that they must rotate groups at the end of the time limit. The time limit might be 15 minutes or 30 minutes, depending on the activity selected.

The MECC MANAGEMENT SYSTEM (disk #150) can be used with MULTIPLICATION PUZZLES to keep a record of student progress. These programs are a part of the MECC MASTERING MATH series. Refer to the manual or disk #150 for information on how to use the management and diagnostic systems in this series. The students' disks can be used with or without these teacher utilities.

MATHEMATICS
K - 3

AREA: DIVISION

OUTCOMES:
1. Separate sets of objects into equivalent subsets in groups of 2, 3, 4, and/or 5.
2. Use repeated subtraction to represent division.
3. Divide using a one-digit divisor and a dividend of not more than 45 no remainder, 45 remainder, 99 no remainder.
4. Use multiplication to check division problems.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Be able to subtract and multiply one-digit times one-digit.

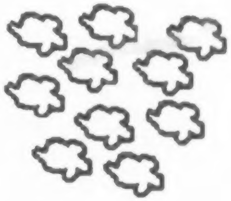
Steps to Success

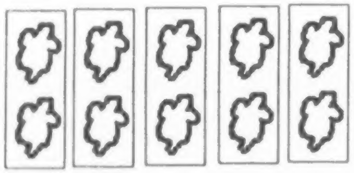
1. For students to have a successful experience with beginning division, they must feel at ease with subtraction and basic multiplication.
2. Allow students to use concrete materials during introduction to division.

ACTIVITY 1 - OUTCOME 1

Give each student a set of 10 cotton balls. Ask students to separate the 10 cotton balls into 5 equal sets.

Example:





ACTIVITY 1 - OUTCOME 1 (Cont´d)

Ask these questions: How many cotton balls are in each subset? (2 cotton balls)

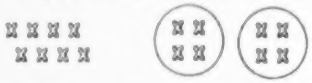
How many 2´s are in 10? (5)

Therefore 10 ÷ 5 = 2 or 10 members separated into 5 equal sets = ☐,
2 members in each set.

Continue this process until students understand division as a separation of sets.

Transfer this process from manipulatives (cotton balls) to pictures or illustrations on paper or on the chalkboard.

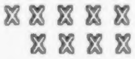
Example: Separate the 8 x´s into 2 equal sets.



Ask this question: How many x´s are in each subset? (4 x´s) Therefore, 8 ÷ 2 = 4 or 8 members separated into 2 equal sets = 4 members in each set.

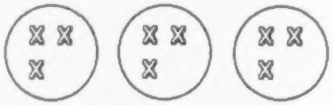
Extension: Give the students a division problem and a set of objects to separate. Ask them to find the quotient.

9 ÷ 3 =



Example:

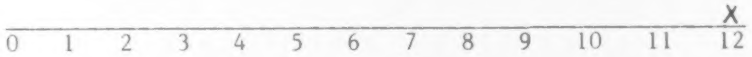
9 ÷ 3 = 3



ACTIVITY 2 - OUTCOME 2

Division can be shown as repeated subtraction by using a number line.

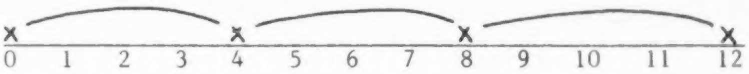
Place a number line on the chalkboard.



Find the number 12 on the number line.

ACTIVITY 2 - OUTCOME 2 (Cont´d)

Count backwards from 12 by 4´s and place a small x on the fourth number until you reach 0.

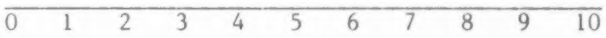


Ask the question: How many x´s did you place on the number line? (3 x´s)
Therefore, 12 ÷ 4 = 3.

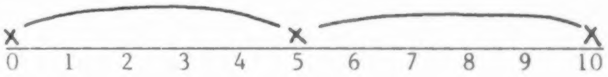
Continue this process until students understand division as a form of repeated subtraction.

Extension: Give students a number line along with a division problem and ask them to find the quotient.

Example: 10 ÷ 5 = ____



Answer... 10 ÷ 5 = 2



ACTIVITY 3 - OUTCOMES 3 and 4

To begin division start by presenting problems in the horizontal form.

Example: 18 ÷ 6 = ____

By presenting problems in this form students can be shown the relationship between division and multiplication.

Example: 18 ÷ 6 = ____ is the same as ____ x 6 = 18
Students know that 3 x 6 = 18, so they will know 18 ÷ 6 = 3.

Ask the questions: How many 6´s are in 18?
How many 3´s are in 18?

Continue this process until students understand that multiplication is the inverse of division.

ACTIVITY 3 - OUTCOMES 3 and 4 (Cont´d)

Begin to introduce the vertical form of division.

Example: $3\overline{)21}$ means the same as $21 \div 3 =$ ____

Model the process for solving a division problem in vertical form.

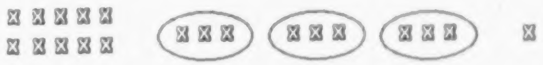
Example:

$$\begin{array}{rl} 7 & \\ 3\overline{)21} & \\ \underline{21} & \quad 3 \text{ x } 7 \\ 00 & \end{array}$$

Remainders

Remainders can be and should be introduced in activities such as ACTIVITY 1.

Example: Separate 10 x´s into 3 equal sets.



Ask the questions: How many x´s are in each set? (3 x´s)
How many x´s are not in a set? (1 x)

Therefore, $10 \div 3 = 3$ with a remainder of 1.

Continue this process until students understand remainders. Begin to introduce remainders in solving division problems.

As problems become more complex, students need to use their knowledge of basic facts to solve many division problems.

ACTIVITY 3 - OUTCOMES 3 and 4 (Cont´d)

Example:

$6\overline{)52}$

Ask the question: How many 6´s are in 52?
Try 9. 9 x 6 = 54
54 is more than 52. Try again.
Try 8. 8 x 6 = 48
O. K.!

$$\begin{array}{r} 8 \\ 6\overline{)52} \\ \underline{48} \\ 04 \end{array}$$

8 x 6 ...subtract 52 -48 to get 4.

If 4 remains, can we subtract another 6? NO.

Our answer is 8 with a remainder of 4 or 8 R4

To reinforce that multiplication is the inverse of division, students should check all division problems by using multiplication.

Example:

$$\begin{array}{r} 8 \\ 6\overline{)52} \\ \underline{48} \\ 4 \end{array}$$

8 x 6

Multiply the divisor..........6
times.........................x
the quotient..................8
48
plus any reminder............+ 4
(if no reminder skip this step)
52 ....answer should equal the dividend.

MATHEMATICS
K - 3

AREA: DIVISION

OUTCOME: 3. Divide using a one-digit divisor and a dividend of not more than 45 no remainder, 45 remainder, 99 no remainder.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know how to load, boot, and operate a computer assisted instructional package.

Steps to Success

1. The teacher should have basic computer skills or access to someone who does.
2. The teacher must have access to at least four computers and appropriate computer software. For example:

   MECC disk # 148 - QUOTIENT QUEST
   MECC disk # 162 - PATH TACTICS

3. DO NOT USE ANY SOFTWARE UNLESS YOU HAVE REVIEWED IT! Make sure that the software fits the needs of your students and pay attention to the time it takes to finish the assignment.
4. It is very important that students are given all the "rules" for using the computers. Spend time letting them get used to the equipment before attempting any CAI activity. This will not take long. After 30 minutes of "discovery" time on the keyboard, most students feel comfortable.
5. If students are not accustomed to group work, it will take a few sessions to get the "bugs" worked out. Students tend to depend a great deal on the teacher, but encourage them to be more independent and responsible for their own work. Don´t give up if things are hectic the first time.
6. Do not expect this to be a quiet activity. It will not be. Maintain order, but remember, this is an ACTIVE-ity.
7. The teacher´s role should be one of helper/facilitator. With more than three groups, this role is difficult to manage. If there are aides or parent volunteers available, use them.

ACTIVITY 1 - OUTCOME 3

Use a computer and a math worksheet generator software package to generate a division worksheet. (If MECC materials are available, use MECC disk # 151 - MASTERING MATH WORKSHEET GENERATOR.) The worksheet should complement the activities and concepts covered by the software package. For example, the MECC MATH WORKSHEET GENERATOR is pre-programmed to generate worksheets that complement QUOTIENT QUEST. It can also generate customized worksheets. Keep in mind that the worksheets should require the same amount of time to complete as the software assignment. You may want to generate more than one worksheet. Two short worksheets might be better than one long one for maintaining interest.

Divide students into groups. The number of students in each group should be equal to or less than one number of computers available. Assign the computer activity to one group and the worksheet to another group. If there are more than two groups, select additional activities from this section or design additional activities so that each group has a different activity. The activities should require minimal teacher involvement, address the same objectives and match the time requirement of the software, so choose carefully.

Set a time limit that is appropriate for the particular computer software selected, and tell the students that they must rotate groups at the end of the time limit. The time limit might be 15 minutes or 30 minutes, depending on the age of the students and the activity selected.

The MECC MANAGEMENT SYSTEM (disk # 150) can be used with QUOTIENT QUEST to keep a record of student progress. These programs are a part of the MECC MASTERING MATH series. Refer to the manual or disk # 150 for information on how to use the management and diagnostic systems in this series. The students' disks can be used with or without these teacher utilities.

MATHEMATICS
K - 3

AREA: FRACTIONS

OUTCOMES:
1. Recognize that objects can be divided into fractional parts.
2. Identify the fraction represented as portions of objects: 1/2, 1/3, 2/3, 1/4, 3/4, 1/5, and 1/10.
3. Identify the fractional parts of members in set: 1/2, 1/3, 2/3, 1/4, and 3/4.
4. Recognize combinations of fractions that make a whole.
5. Compare fractions with like denominators.
6. Order like fractions with like denominators.
7. Demonstrate an understanding of fractional parts of a whole by applying knowledge to realistic situations.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know the value of numbers.
2. Have experiences with grouping sets into subsets.

Steps to Success

1. Use many concrete manipulatives to introduce fractional relationships.
2. Allow ample time for concrete experiences for each fractional relationship.
3. Work with fractions having like denominators before progressing to unlike denominators.

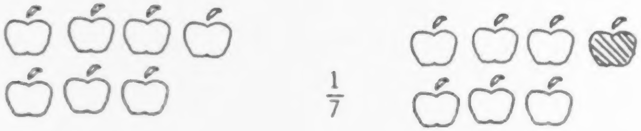
ACTIVITY 1 - OUTCOMES 1, 2, 3, and 4

Use sets of real objects to demonstrate the meaning of fractional parts.

Bring a group of apples to class. Show the class the apples. Count them and draw a picture on the board. Remove one apple from the bunch. Shade in one apple on the board to show that one apple was removed. Write the fraction to show what part of the group was removed.

ACTIVITY 1 - OUTCOMES 1, 2, 3, and 4 (Cont´d)

Example:



EXTENSIONS: Follow the same method using a:

1. set of six-pack soft drink cans. Move some cans away from the group.
2. pack of five sticks of gum. "What fraction of the set did I take out of the pack?"
3. set of pencils, sharpened and unsharpened. "What fraction of the set is sharpened?"
4. set of student shoes. "What fraction of the set is tennis shoes?"
5. set of students. "What fraction of the group is boys? girls?"

Rearrange the sets to show different fractions. Be sure to point out what equals one whole.

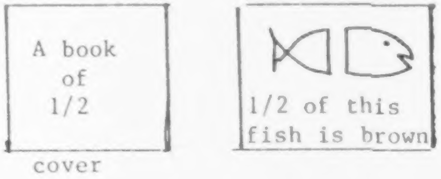
ACTIVITY 2 - OUTCOME 1

Use classroom graphs to demonstrate fractional concepts. Refer to: K-3 Geometry, Graphs.

ACTIVITY 3 - OUTCOMES 2, 3, and 4

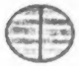
Students can make fraction booklets. They can select a fraction (1/2, 1/4, etc.) and draw a picture of an object that can be cut into the fractional parts. Magazine pictures of objects can also be cut into fractional parts.

Example:

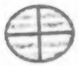


ACTIVITY 4 - OUTCOMES 3 and 4

Hold up a construction paper pizza.



1. Fold the paper in half and cut apart.



2. Fold these parts (halves) in half and cut apart.

3. Place one piece at a time on display and say:
   1 piece is 1/4 of the pizza.
   2 pieces are 2/4 of the pizza.
   (Some students may notice that this is also 1/2 of the pizza.)
   3 pieces are 3/4 of the pizza.
   4 pieces are 4/4 of the pizza or the whole pizza.

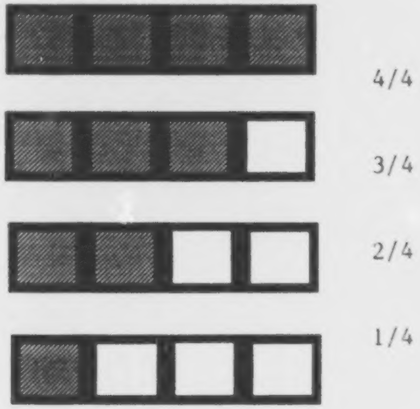
Students are given brown paper circles and asked to cut them into fractional parts. (They can also add paper pepperoni, cheese, etc., decorations.)

Extension: Students can make pizzas using English muffins and cut them into fractional parts.

ACTIVITY 5 - OUTCOMES 5 and 6

Draw the following fractional parts on the board.

Example:



Lead students into a discussion of which fractions are larger and which are smaller.

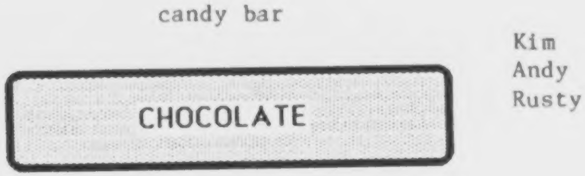
Give each student a handout with the fractional parts on them. Students can cut each fractional strip from the handout and be lead by the teacher in comparing and ordering fractions.

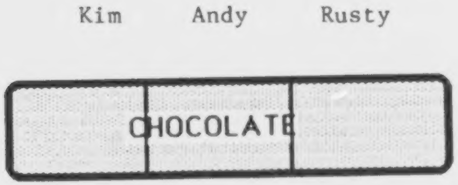
ACTIVITY 6 - OUTCOME 7

Give students several word problems and allow them to role-play.

Example: Kim has a candy bar and she wants to share it equally with Andy and Rusty. How can Kim do this?

Example:


candy bar
CHOCOLATE
Kim
Andy
Rusty


Kim
Andy
Rusty
CHOCOLATE

MATHEMATICS
K - 3

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOMES:
1. Use vocabulary to describe quantity.
2. Recognize that objects can be measured.
3. Use nonstandard units to measure objects.
4. Recognize and use the following measurements: inch, foot, quart, pint, gallon, pound, ounce, degree, centimeter, millimeter, liter, gram, kilogram.
5. Use a ruler to measure distances to the nearest one-half inch and nearest centimeter.
6. Measure capacities in whole or half units.
7. Look at an object and estimate the unit of measurement to be used.
8. Identify the temperature of boiling water, normal body temperature.
9. Solve simple word problems involving customary measurement, metric measurement.
10. Read a thermometer in degrees Celsius and Fahrenheit.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Compare and order objects according to similarities and differences.
2. Have a background of comparative vocabulary. (for example: smaller, taller, etc.)
3. Be able to identify numerals.

Steps to Success

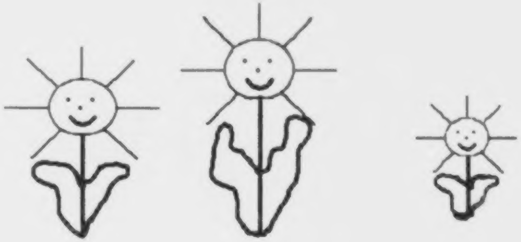
1. Classification, comparing, and graphing activities are a foundation for measurement activities.
2. Measurement should be taught in a variety of ways throughout the entire school year.
3. Measurement vocabulary should not be stressed until the concept of measurement is understood. First establish a need for using standard units.
4. Students need to learn that linear measurement is a method of laying down units of length end-to-end. Thus, when given a ruler students will not align the beginning edge of an object to be measured with number 1.
5. For explanation purposes, linear, mass, and capacity measurements will be described as different topics.

ACTIVITY 1 - OUTCOMES 1 and 2

Over a period of several weeks make a height-growth record by using a paper strip for each student.. Begin by comparing the height of two children on the first day. Have the students stand up against their strips of paper taped to a wall.

Indicate each students height and fold under any excess paper. Use questions to discuss taller than and shorter than relationships. In following days, as more students are measured, order the strips from shortest to tallest. The paper strips can be decorated with leaves and each child can make a small paper plate sunflower to be taped to the top of the paper strip or "stem". Record new growth by unfolding the paper strips.

Example:

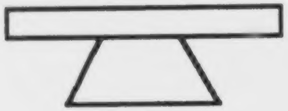


Variation: Have students discuss and share photos of themselves taken when they were younger and smaller.

ACTIVITY 2 - OUTCOMES 1 and 2

Compare weights of children. Make a child-size teeter-totter using a board and center support.

Example:



Have two students sit down. Compare their weights. (for example: Johnny is heavier than Mary. Mary is lighter than Johnny.)

ACTIVITY 3 - OUTCOMES 3 and 7

Collect items to use in measurement activities: wooden cubes, cuisenaire rods (orange), unifix cubes, string, centimeter cubes, strips of tagboard cut into (2cm x 5cm) rectangles, jumbo paper clips.

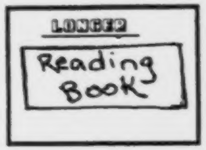
Have one student name a classroom object to be compared with one of the above objects. Choose another student to estimate whether the chosen object is smaller than, larger than, or the same length as the measuring tool. Check the prediction.

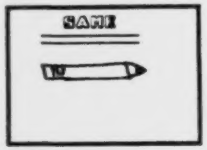
Students can also estimate the unit of measure to be used with measuring an object.

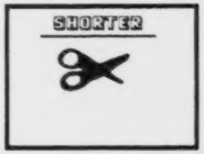
ACTIVITY 4 - OUTCOME 3

In a shoe box, place a collection of common items (erasers, pencils, scissors). Ask the student to choose a straw and sort the objects into three piles: longer than, nearly the same length as, or shorter than the straw. Write the outcomes.

Example:







ACTIVITY 5 - OUTCOMES 4 and 5

Have students make a ruler using twelve 1 inch tagboard strips taped together. Number the strips. Compare homemade rulers with a standard ruler.

Have students make a centimeter ruler using ten tagboard strips 10 cm. long. Color each 10 cm. strip a different color.

Have students use their paper rulers to measure common classroom objects.

ACTIVITY 6 - OUTCOMES 4, 5, and 9

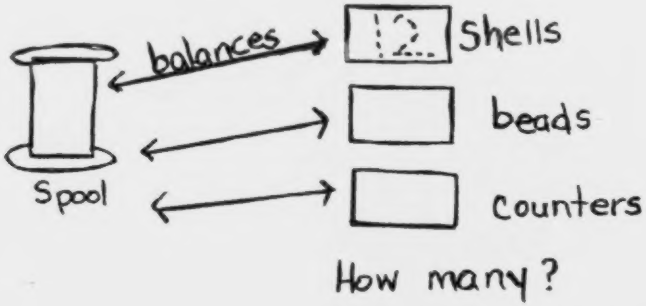
Using the centimeter paper rulers play "I SPY". Divide into small groups. Give each group five written directions. For example, direct students to find something that is 17 cm. long.

Use the above activity with standard rulers.

ACTIVITY 7 - OUTCOME 3

Provide students opportunities to use balance scales to compare objects and write down their findings. Findings can be recorded as shown below.

Example:



ACTIVITY 8 - OUTCOME 3

Use nonstandard units in a cooking activity.

Use a balance scale to help prepare the following recipe.

Write this recipe on a chart and draw illustrations:

TWELVE CUPCAKES

A - You need 2 eggs.
B - You need enough margarine to balance 2 eggs.
C - You need enough sugar to balance 2 eggs.
D - You need enough flour to balance 2 eggs.
E - Cream the margarine and sugar in a bowl.
F - Add the 2 eggs and beat together in the bowl.
G - Add the flour and just a little milk to make the mixture creamy.
H - Bake in muffin tins at 375° F for 15 minutes until golden.

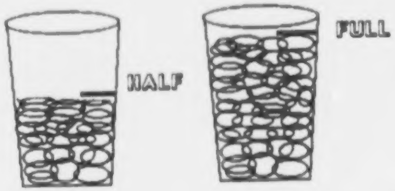
ACTIVITY 9 - OUTCOMES 8 and 10

Refer to Grades 4-6, Time Measurement, and Money, Outcome 36.

ACTIVITY 10 - OUTCOME 6

Use 2 identical plastic containers and label each container with a full and half-full mark. Fill one container with beans to the half-full mark and the other container to the full mark. Compare weights of each container. Use other materials to fill each container.

Example:



MATHEMATICS
K - 3

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOMES:
11. Tell time on circular or digital clock to 1/2 hour, 1/4 hour.
12. Solve problems involving elapsed times in 15, 30, or 60 minute increments.
13. Determine the difference in the time on two clocks.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Understand a number line from 0-60.
2. Visualize numbers.
3. Count by 5´s from 0 to 60.

Steps to Success

1. Telling time is difficult to teach. Don´t Rush!
2. Do not introduce "after the hour" and "to the hour" until students are confident and efficient with reading the clock.

ACTIVITY 1 - OUTCOME 11

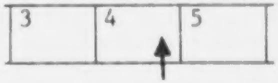
Use a large number line on the wall or draw one on the chalkboard from 0 to 12.

Cut a red arrow out of construction paper.

1	2	3	4	5	6	7	8	9	10	11	12

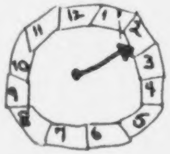
ACTIVITY 1 - OUTCOME 11 (Cont´d)

Use the arrow to point to a numeral and have the students read it. Next, place the arrow so it is pointing somewhere between two numerals.



Explain to students that the number is read as the least value until it reaches the next number. After students are successful at reading the arrow pointing at the number line, connect the ends of the number line together with a brass fastener to make a circular shape. Place the arrow in the center and have children practice reading what numeral the arrow is pointing toward.

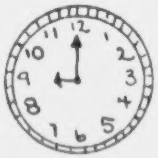
Example:



ACTIVITY 2 - OUTCOME 11

Make paper plate clocks so that students will have their own clock. It helps if the hands are different colors. Make the hour hand red and minute hand black.

Example:



ACTIVITY 3 - OUTCOME 11

Introduce the word "o´clock" as meaning "of the clock." Show various times on the hour and have children relate events which happen at those times. For example: What are you doing at 7 o´clock each morning? What are we doing at 11 o´clock on a school day? Pretend that time has passed and, as you explain this, move the minute hand a complete clockwise rotation. Discuss the fact that each hour comes twice a day. Call out various times (to the hour) and have students show the time on their own clock. Have students hold up their clocks.

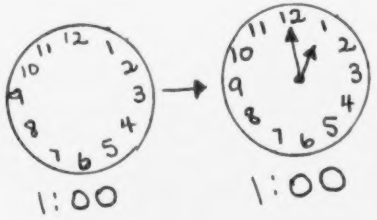
Extension: Include half hour in clock reading.

ACTIVITY 4 - OUTCOME 11

Use library card pockets pasted onto posterboard. Write various times on the pockets. Using a clock stamp make several cards with clocks. Students should draw the hands on the blank clocks to show the times listed on the envelopes. Have students place the clock cards in the appropriate pocket.

Extension: Have students make the cards for the pockets.

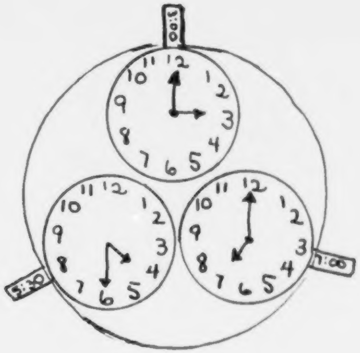
Example:



ACTIVITY 5 - OUTCOME 11

Using a cardboard pizza tray, stamp clock faces around the tray and draw the hands on each clock. Write the corresponding times on clothespins. Have students match the clocks and clothespins.

Example:

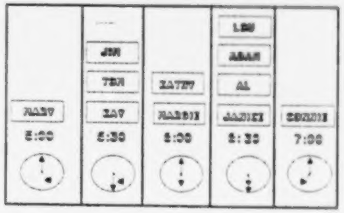


ACTIVITY 6 - OUTCOME 12

Give students examples of elapsed time relating to activities with varying beginning and ending times. For example: Recess begins at 10:25 and lasts thirty minutes. What time does it end? Lunch begins at 11:15 and lasts twenty minutes. What time do students leave the lunchroom? Continue with examples relevant to students. Post a daily class schedule so students can see how their day is spent.

ACTIVITY 7 - OUTCOME 12

Make a chart showing possible dinner times. Distribute squares of paper to students and ask them to draw a picture of themselves at dinner time. Have the students place their pictures on the chart according to the time they eat dinner. (Younger students may need to ask their parents the day before). Ask questions such as: Mary eats dinner at 5:00. How much later does Janice eat dinner?

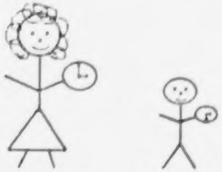


ACTIVITY 8 - OUTCOME 13

Using a teachers clock show students a specified time on the clock. Ask students to show on own paper plate clocks, what time it would be if 15 minutes had passed. For example: Show 2:00. Students should respond by showing clocks with 2:15.

Extension: Have pairs of students come to the front of the group. Whisper a different time to each of the two students. Have them show the time whispered in their ear on their clock. Have the remaining students identify the difference between the two times.

Example:



AREA: TIME, MEASUREMENT, AND MONEY

OUTCOMES:
14. Identify morning, afternoon, and night.
15. Name and identify in sequence days of the week, months of the year.
16. Use a monthly calendar to identify specified days or dates.

NOTES FOR THE TEACHER

Steps to Success

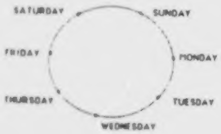
1. The use of a calendar should be a daily activity throughout the school year.

ACTIVITY 1 - OUTCOME 14

Use pictures showing activities taking place at various times of the day. (For example: A little boy in his pajamas brushing his teeth) Ask students when do they think this would take place? Morning, afternoon, night? Why?

ACTIVITY 2 - OUTCOME 15

Draw a large circle on the chalkboard. Label one point on the circle "Sunday" and have the students name succeeding days. Write each one on the circle. Discuss the idea that after one week is completed, a new week begins with the same names for its days. Use the circle to illustrate this fact.



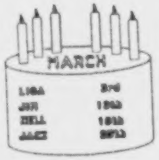
ACTIVITY 3 - OUTCOME 15

Have students keep a daily journal. Students should enter the day of the week, and the date at the beginning of each entry. Kindergarten students can draw pictures and use inventive spelling for their diary entries. Upper level students should write sentences about happenings at home or school.

ACTIVITY 4 - OUTCOMES 15 and 16

Make 12 birthday cake patterns out of posterboard. Label each cake with the name of a month. Display the months in order. (Jan., Feb., March, etc.) List students´ names and dates of birth on the corresponding monthly calendar.

Example:



MATHEMATICS
K - 3

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOMES:
17. Identify and name common U. S. coins and dollar bill.
18. Name or write the value of a set of coins and/or currency.
19. Solve problems involving money.
20. Convert coins to equivalent value.
21. Make change to one dollar using appropriate coins.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Understand place value.
2. Add whole numbers.
3. Subtract whole numbers.

Steps for Success

1. Send a note to the parents naming the coins that will be worked with in class. Ask parents to spend time with their child counting money.

ACTIVITY 1 - OUTCOME 17

Use a display board or tape pictures of money to the chalkboard. Write the name of each coin. Discuss the colors of coins, what they are made of, and their various sizes. Have young children notice that the edge of a dime feels bumpy; and if they rub it with their fingernails, it will make a noise.

ACTIVITY 2 - OUTCOME 17

Have the teacher put different coins in a mystery bag. Select a student to hold and examine a coin. Have the student locate that coin in the mystery bag. Continue with other coins. Place the mystery bag at a learning center so all students will have the opportunity to find and identify the coins by touch.

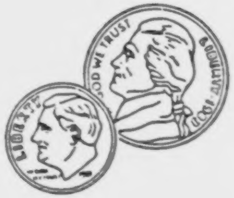
ACTIVITY 3 - OUTCOME 18

Display pictures of various amounts of money. Give students a duplicated sheet divided into 12 sections. Have students write the total value of the coins.

Example:

NAME	DATE	
1 15¢	2	3
4	5	6
7	8	9
10	11	12

1.



ACTIVITY 4 - OUTCOME 18

Duplicate and display a chart for each child as shown. Have students bring in wrappers and/or labels of items that cost the prices shown on their charts. Have students tape the wrappers and/or labels in the square that shows the price of the item.

Example:

NAME	
5 ¢	10 ¢
15 ¢	25 ¢

ACTIVITY 5 - OUTCOME 19

Save cash register receipts of low cost items and cut off the totals. Have parents save receipts with four or fewer items. Have students total the receipts.

ACTIVITY 6 - OUTCOMES 19, 20, and 21

Set up a play store in the classroom by bringing in empty boxes and empty canned items. Price groceries. Give students play money and allow them to purchase an item.

ACTIVITY 7 - OUTCOME 19

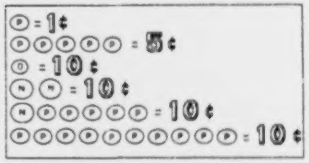
Have students select any 2 products from the class store. Have students list them and find the total cost.

Example:

COKE	50¢
CHIPS	25¢
	75¢

ACTIVITY 8 - OUTCOME 20

Make a money chart. The chart can be made by taping pictures of coins to a piece of tagboard. Have students help by naming possible combinations.



ACTIVITY 9 - OUTCOME 21

Have students use the food section of the newspaper and select a designated number of items not to exceed a total purchase price of $1.00. Have students pay for the items using a one dollar bill, and determine how much change they should receive.

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOMES: 22. Know his/her own telephone number, birthdate, zip code.
23. Distinguish between and identify telephone, area code, and address numbers.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Be able to identify numerals 0-9.
2. Be able to match letters, numerals, and words.

Steps to Success

1. Students will need varied and repeated experiences to grasp these skills.
2. These skills are more relevant when they are incorporated in units such as safety and community helpers.
3. Language experience activities such as writing and addressing letters to parents, visitors, and classmates should be included.

ACTIVITY 1 - OUTCOME 22

A mailbox game can be used to determine if each student already knows his address. The teacher prepares envelopes with each student's address. The teacher reads an individual's address. If a student recognizes his own address, he will raise his hand. If he has correctly identified his address, a designated student postman will deliver the envelope to him.

To check birthdates and/or telephone numbers, paper telephones and birthday cakes may be used instead of addressed envelopes.

ACTIVITY 2 - OUTCOME 22

Prepare a bulletin board to encourage children to master these skills. Refer to Alabama Cares for patterns and suggestions.

ACTIVITY 3 - OUTCOMES 22 and 23

Each student will need a bingo card with his/her individual phone number (including 1 + area code*).

1-	2	0	5-	2	3	4-	6	7	8	9

Play bingo as follows:

Step 1. Distribute bingo markers to each child. (clear markers, if possible)
Step 2. The numeral one plus the area code are free spaces and are covered before play begins.
Step 3. The teacher, using several sets of 0-9 numeral cards, calls out one number at a time. The child uses a marker to cover that number if the number is on his card. Only one number may be covered at a time.
Step 4. The first child to cover every number in his card says, "bingo."

* Explain to students that these numbers (1 + area code) are not always needed. These numbers are taught as a safety precaution.

ACTIVITY 4 - OUTCOME 23

In a learning center, children are asked to sort cards showing telephone numbers and cards showing addresses with zip codes into two boxes labeled Telephone Directory and Post Office Box.

ACTIVITY 5 - OUTCOME 23

Write this example on the board:

Melissa Grant
2590 South Street
Opp, Alabama 35678
(205) 259-8352

Ask the students these sample questions:

What is Melissa´s telephone number?
What is the area code?
How many numbers are always in an area code?
What is Melissa´s address number?

Other similar examples should be provided.

MATHEMATICS
K - 3

AREA: GEOMETRY

OUTCOMES:
1. Use vocabulary to describe position.
2. Recognize and name square, rectangle, triangle, circle.
3. Recognize simple congruent shapes and figures.
4. Recognize and name lines, line segments, rays, angles, polygons, lines of symmetry.
5. Calculate the perimeter of a square and/or rectangle.
6. Find the area of plane figures by counting square units.
7. Identify and name the solid figures cone, cube, sphere.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Observe their environment.
2. Sort and classify.
3. Know how to add (Outcome 5).

Steps For Success

1. Children should be encouraged to discover characteristics of specific shapes through direct examination of models, geoboards, tangrams, and other concrete materials.
2. Avoid rigorous formal explanations.
3. Geometry should be taught at varying intervals during the year. It blends well with measurement, patterning, and classification. It should not be taught "all at once".
4. Foster attitudes of inquiry.
5. Prepare a "feelie box" of geometric shapes of varying sizes.

ACTIVITY 1 - OUTCOME 1

Introduce vocabulary (inside, outside, on, before, after, between, and beside) using the relative positions of children in the room. Give verbal directions.

Example: Stand beside your desk.

Extend the activity by giving each child a button, paper cup, and juice can. Give directions for the placement of the button. Vary the activity by modeling the position of the button and asking children to describe its position. Finally, ask children to mark two-dimensional positions using pencil and paper.

Example: Mark the inside of a rectangle.

ACTIVITY 2 - OUTCOME 2

Introduce squares, rectangles, triangles, and circles to students. Bring in household objects representing each shape. Display objects on a table. Call attention to each objects shape. Allow children to feel the edge of the objects. Ask children to find as many other objects of that shape as they can while looking around the classroom. Let children identify and cut out magazine pictures which are the designated shape being studied.

ACTIVITY 3 - OUTCOMES 2 and 3

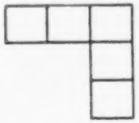
Provide manipulatives for children to explore different kinds of lines and shapes. Geoboards, cuisenaire rods, tangrams, and pattern blocks may be used. Pipe cleaners, toothpicks, and straws may be used to form shapes. Toothpicks may also be used to form congruent shapes represented on teacher-made handouts.

ACTIVITY 4 - OUTCOME 3

Use a "feelie box". Ask a child to feel the shapes inside the box and locate two which are the same shape and size.

ACTIVITY 5 - OUTCOME 3

Use ceramic tiles or plastic 1 inch square tiles for manipulative activities. Model a figure made out of square tiles.

Example: 

Have students make a congruent shape from their tiles. (Construction paper cut into squares can be used as well.)

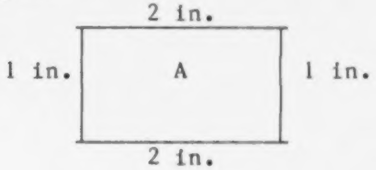
ACTIVITY 6 - OUTCOME 4

1. Line symmetry can be introduced by folding pieces of paper and having children cut out familiar shapes, i.e., hearts, Christmas trees.
2. Show students real objects that could be described as models of line segments.
3. Use geoboards to make line segments and angles.
4. Discuss the difference between lines, rays, and line segments.
   Sample questions:
   How many end points does a line have?
   How many end points does a line segment have?
5. Locate angles in and out of the classroom.

ACTIVITY 7 - OUTCOMES 5 and 6

To find the perimeter of a square or a rectangle measure each of the four sides. The sum of the four sides is the perimeter of the figure.

Example:



$$\begin{array}{r} 1\text{ in.}\\ 2\text{ in.}\\ 1\text{ in.}\\ +\ 2\text{ in.}\\ \hline 6\text{ in.}\end{array}$$

6 inches is the perimeter of rectangle A.

Give the class practice in finding the perimeter of several classroom objects. (Choose an appropriate unit of measure.)

Example: the desk top
notebook paper
textbooks

To teach "area" refer to 4-6 Geometry Outcome 5.

ACTIVITY 8 - OUTCOME 7

Use models of cones, cubes, and spheres. Introduce each figure´s correct name. Allow the students to form the figures from modeling clay. Bring in cones, cubes, spheres from the environment.

Example: ice cream cones, boxes, baseballs, etc.

AREA: GEOMETRY

OUTCOME: 8. Identify cube as a unit of volume.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Be familiar with solid figures.

Steps to Success

1. Students in the primary grades should have many opportunities to work with non-standard as well as standard units of measurement.
2. Students should have repeated experiences with finding out the size of particular objects by making direct comparisons. (For example: Match pencils to see which one is longer.)

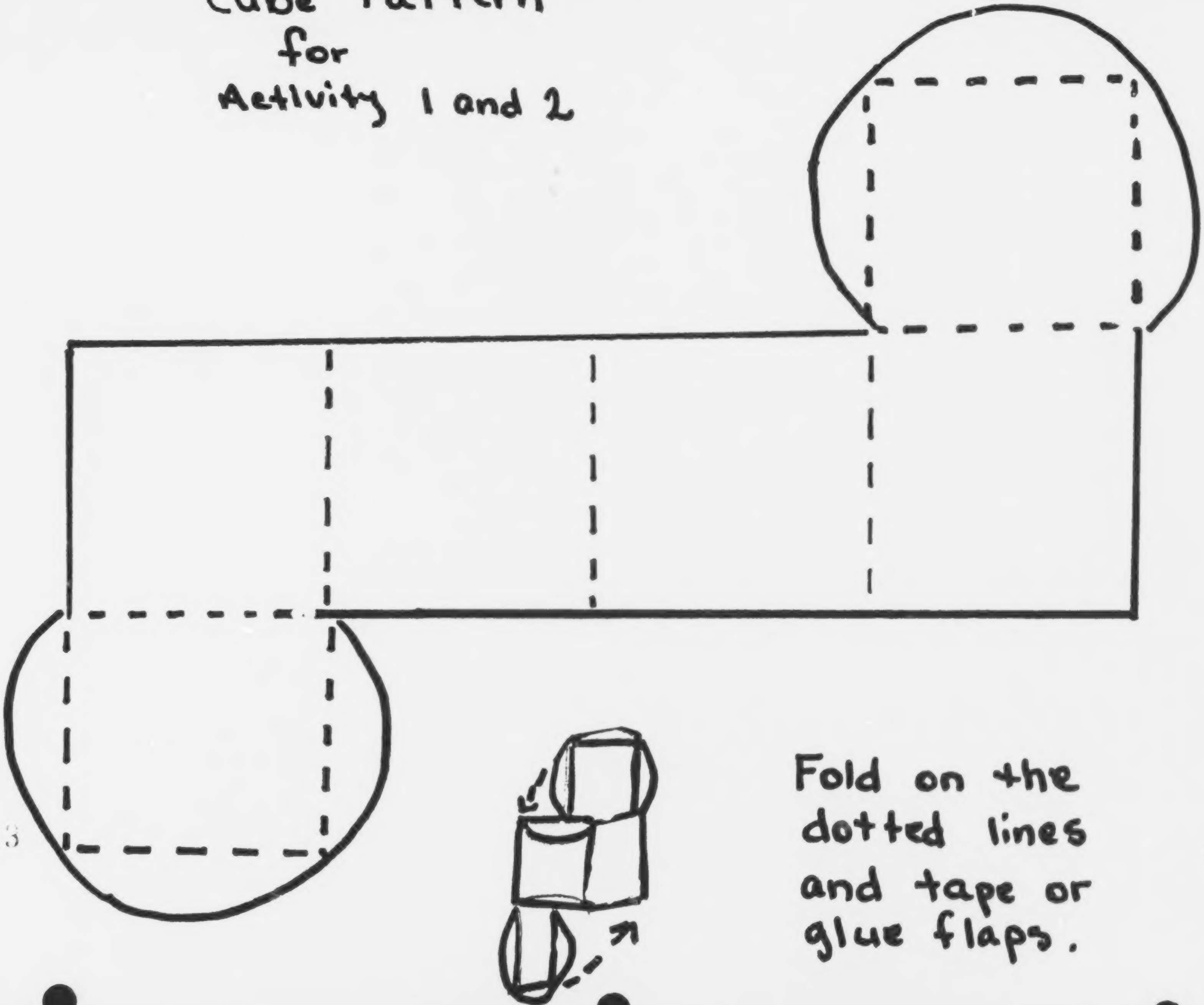
ACTIVITY 1 - OUTCOME 8

Students make a construction paper cube using the provided pattern. The teacher selects two boxes of different sizes. The students are asked to guess which box they think will hold the most cubes. Students check their estimates by filling the boxes with the paper cubes. They can also estimate the number of cubes needed to fill each box.

ACTIVITY 2 - OUTCOME 8

Students guess how many buttons (seeds, shells, etc.) it will take to fill their cube made in Activity 1. They check their predictions by filling up their cube.

Cube Pattern
for
Activity 1 and 2



Fold on the
dotted lines
and tape or
glue flaps.

AREA: GEOMETRY

OUTCOMES:
9. Interpret graphs using real objects.
10. Interpret information on a pictograph, bar graph, line graph, circle graph, map, chart.
11. Use information to construct a line graph, bar graph, circle graph.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Classify objects by attributes.
2. Understand one-to-one correspondence.
3. Use terms "more" or "less".

Steps to Success

1. Graphing should be taught throughout the year.
2. Use graphs to record daily information. (For example: calendar activities, birthday graphs, tooth graphs)
3. Combine graphing activities with unit work for an integrated approach to learning.
4. Collect objects to use in graphing activities.
5. Pre-cut acetate squares or construction paper squares.

ACTIVITY 1 - OUTCOMES 9 and 10

Use real objects or people for comparison. Through discussion, generate categories to use for a real graph. For example, ask each child to bring a toy received for Christmas to share with the group. Discuss how the toys could be grouped. (dolls, stuffed animals, games) Make labels for each category named. Use the actual objects and place under the appropriate category heading.

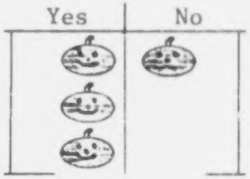
ACTIVITY 2 - OUTCOMES 9 and 10

Find an old, discarded window shade. With a permanent marker, draw vertical and horizontal lines. Use the window shade as a graphing mat. Use pictures or word cards to label the intended categories. Real objects can be placed on the graphing mat. The window shade may be easily rolled out onto the floor for real graphing activities. For example, have each child remove one shoe. Graph the shoes into one-color shoes, two-tone shoes, or multi-color shoes. Place the actual shoes on the graphing mat. Discuss the outcomes.

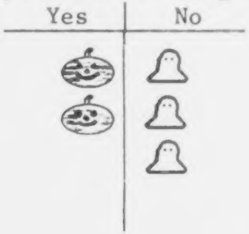
ACTIVITY 3 - OUTCOME 10

Use student-drawn pictures or artwork to construct and interpret pictographs.

Examples: Do you dress up for Halloween?

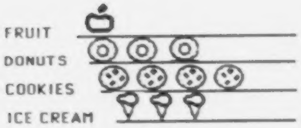


Do you believe in ghosts? (Use students' art work.)

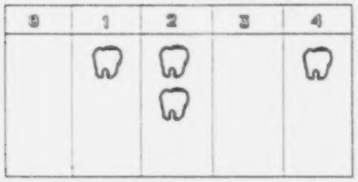


ACTIVITY 3 - OUTCOME 10 (Cont´d)

What should we eat at our party?



Have you lost any teeth?



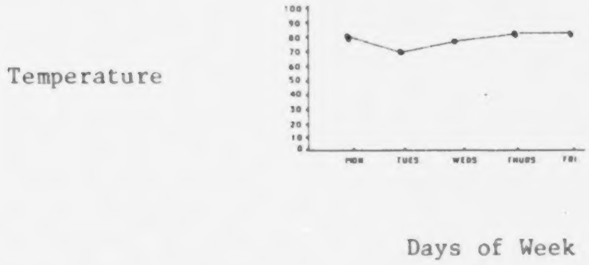
ACTIVITY 4 - OUTCOMES 10 and 11

Use the overhead projector and pre-cut colored acetate squares. With the class generate categories for a bar graph. Decide upon three or four categories involving student preferences. For example, ask what type TV shows do the children like? Categories might be cartoons, movies, news, action character stories. Illustrate the process of making a bar graph. Use the acetate squares and interpret the information accordingly. Discuss each step with students. Do other graphs on other days.

ACTIVITY 5 - OUTCOMES 10 and 11

Record the daily temperature on a line graph. Discuss the results. Record for a week at the time. This activity could be done on a bulletin board using yarn for lines.

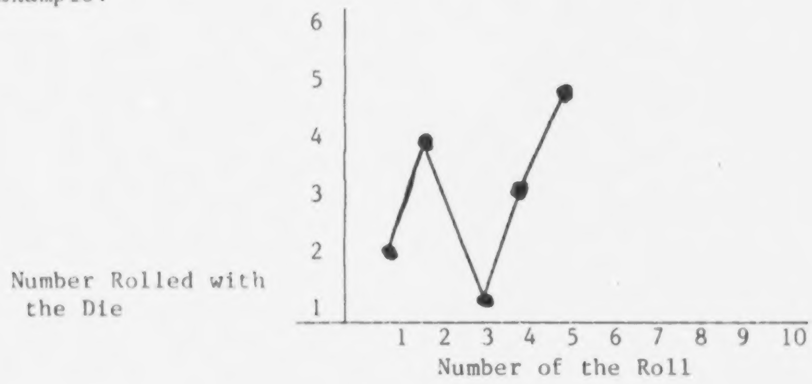
Example:



ACTIVITY 6 - OUTCOMES 10 and 11

Students should make their own line graph to record how often the numbers one through six (1-6) occur when a die is rolled.

Example:



AREA: GEOMETRY

OUTCOMES: 2. Recognize and name square, rectangle, triangle, circle.
4. Recognize and name lines, line segments, rays, angles, polygons, lines of symmetry.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know how to load, boot, and operate a computer assisted instructional package.
2. Understand the concepts of left, right, forward, and back and give directions using these terms.
3. Be introduced to LOGO and the "turtle" and can successfully move the turtle forward, back, left, and right on the computer screen. MECC worksheets that accompany disk # 775 - EZ LOGO are helpful in introducing basic LOGO concepts.

Steps to Success

1. The teacher should have basic computer skills or access to someone who does.
2. The teacher must have access to computers and appropriate software. This activity is designed to be used with MECC disk #775 - EZ LOGO. Other versions of LOGO may be used, but keep in mind that the references to LOGO worksheets are to the MECC materials only.

ACTIVITY 1 - OUTCOMES 2 and 4

Students should be working two-on-one with a computer. If necessary, divide the class into groups and have a "computer" group and "activity" group(s). The students in the activity group should be given written activities that require minimal teacher involvement as the teacher will be working primarily with the computer group.

ACTIVITY 1 - OUTCOMES 2 and 4 (Cont'd)

1. Show the students a picture (on a chart, large card, or chalkboard drawing) of a vertical line that is 10 inches long.
2. Explain that they are to have the "turtle" draw a line like the one in the illustration.
3. Tell the students that the line is 10 units long. Remind them that the turtle will move in blocks of 10.
4. Direct students to command the turtle to draw the line.
5. Show students a picture of a right angle formed by a horizontal line leading off to the right at the top of a vertical line. Each line is 10 inches long. Explain the relationship of the two lines. (They are equal in length.)
6. Direct the students to command the turtle to continue their drawing by adding a vertical line to form the angle shown in the second illustration. Let students "discover" how to accomplish this task. Do not give explicit directions. Discussion of how this is accomplished should follow.
7. Show the students a picture of a 10 x 10 square with the bottom line missing. Explain how the third line relates to the other two. Point out the angles that are formed by the three lines and that the lines are equal in length.
8. Direct students to continue their drawing by adding a third line so that their picture looks like the illustration.
9. Show students a picture of a 10 x 10 square. Explain the relationship of the square to the previous pictures. Point out the angles. Discuss the positions and the relationships of the four lines to each other.
10. Direct students to command the turtle to continue their drawing to make a complete square.
11. Review all of the steps to forming the square.
12. Direct students to clear their screens and draw another square that is 20 x 20 turtle units.
13. Let students explore by drawing various sizes of squares and extending two sides to make rectangles.

AREA: GEOMETRY

OUTCOME: 10. Interpret information on a pictograph, bar graph, line graph, circle graph, map, chart.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Be introduced to the concept of graphing.

Steps to Success

1. When constructing graphs, use information that is directly related to the students. This keeps interest high.
2. The teacher should have basic computer skills or access to someone who does.
3. The teacher must have access to a computer and appropriate graph-generating software. (For example: MECC GRAPH disk #137).

ACTIVITY 1 - OUTCOME 10

Use the computer to generate a bar, circle, and line graph using the same data for each. (There are many graphing software packages available. MECC Graph disk #137 is an example of one.) Choose data that is directly related to the students. For example, choose height of students, type of pets owned by students, favorite colors of students, favorite TV shows, etc. (This information can be gathered the day before.) Give each student a set of the graphs. Have them take each graph and shade the sections with different colors, making sure that each graph is color coded in the same way. Then lead students in a discussion of the interpretation of the data displayed by each graph, including how the graphs are the same and how they are different. Take a poll of the class to find out the favorite type of graph for each student. Use this information to generate a new graph based on this information. If possible, do this on a computer in the classroom as the students watch. If not, generate the graph outside of class and show it to the students at the next class meeting. Post a copy of each graph on a bulletin board.

MATHEMATICS
K - 3

AREA: APPLICATIONS

OUTCOMES:
1. Compose and solve simple story problems.
2. Solve word problems involving addition, subtraction, and/or multiplication.
3. Determine the necessary operation needed to solve a word problem.
4. Identify the information needed to solve a word problem.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Understand addition, subtraction, and/or multiplication.

ACTIVITY 1 - OUTCOMES 1, 2, 3, and 4

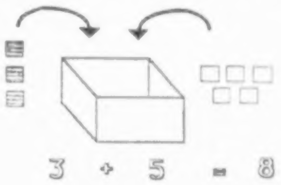
Use blocks of different colors to illustrate addition problems. Let students write the appropriate number sentence.

Example: Student writes: 2 + 3 = 5

ACTIVITY 2 - OUTCOMES 1, 2, 3, and 4

Have one student place a number of blocks into a small box. Ask another student to place blocks of a different color into the same box. Have students write the number sentence describing what is in the box. Let a student count the total number of blocks and report his findings to the class. The class can check their number sentences.

Example:



ACTIVITY 2 - OUTCOMES 1, 2, 3, and 4 (Cont´d)

This same activity can be modified for subtraction. Extensions will be needed to completely address Outcomes 3 and 4.

ACTIVITY 3: OUTCOMES 1, 2, 3, and 4

Have students solve everyday problems using multiplication. Remind students that the multiplication process is faster than addition in solving problems.

Sample problems:

1. Joan has two poodles. She feeds them two cans of dog food each day. How many cans does she need to feed her dogs for one day?
2. Jack wants to give each one of his friends 5 pieces of gum. He has four friends. How many pieces of gum does Jack need?
3. Mrs. Mitchell wants to give each of her 25 students 2 pencils for a surprise on Friday. How many pencils does Mrs. Mitchell need to buy for her class?

Be sure to vary activities to address Outcomes 3 and 4.

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			CLASSIFYING AND COMPARING				
		K	Arrange shapes, sizes.	1. Recognize the same shape when it appears in different positions.			
		K	Classify shapes, sizes, colors.	2. Locate objects according to size.			
		1	Recognize likenesses and differences in shapes, sizes, and quantities.	3. Classify objects according to size.			
		K	Compare shapes and sizes.	4. Use vocabulary to label groups of objects. (Ex. COLOR: primary and secondary; SIZE: small, little, middle-sized, medium, large, big, giant; SHAPE: round, box-like, diamond-like)			
		1	Comprehend use of comparative terms.				
1			Demonstrate an understanding of the principles of geometry and measurement.	5. Use the terms "same" and "different" as they apply to shapes, sizes, colors, and quantities.			
				6. Compare objects according to similarities and differences.			
				7. Order objects according to shapes and sizes.			
				8. Use vocabulary to compare groups of objects. (Ex. small, smaller, smallest)			
			COUNTING				
		K 1,2	Use one-to-one correspondence.	9. Answer the question "how many" for a set of objects. (1 to 10)			

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			COUNTING (Cont´d)				
		3	Identify equivalent sets.	10. Match or associate a written symbol to members of a set.			
		K	Understand concepts of numbers 1-10 through the use of manipulative objects.	11. Demonstrate an understanding of one-to-one correspondence. (Ex. object-to-action, object-to-object, object-to-words)			
			Match numbers to members of a set:				
		K	1-10	12. Count objects in a set arranged in groups of: 1´s, 2´s, 5´s, 10´s to 100; 2´s, 5´s, 10´s, 100´s to 1000.			
		1	1´s, 2´s, 5´s, 10´s, to 100				
		2	2´s, 5´s, 10´s, 100´s to 1000				
1,2			Demonstrate an understanding of the system of whole numbers by counting and recognizing names for numbers.	13. Say word names in order from one to: 100, 1000.			
				14. Say word names in order by: 2´s, 3´s, 5´s, 10´s to 100.			
			Count by ones to:	15. Count by multiples of a number. (Ex. 50´s to 1000; 100´s to 10,000)			
		K	100				
		1	1000				
		K	Begin counting by tens.				
		2,3	Extend counting by multiples of a number.				

MATHEMATICS: K-3 AREA: Numeration (Cont´d)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			PLACE VALUE				
		 1 2 3	Recognize place value to: hundreds thousands millions.	16. Identify the place value of each digit in a: three-digit numeral six-digit numeral nine-digit numeral.			
1,2			Demonstrate an understanding of place value by reading and interpreting numerals and by comparing and ordering numbers.	17. Name or write the numerals for a number of objects grouped as: tens and ones hundreds, tens, and ones thousands, hundreds, tens, and ones.			
				18. Name or write the numeral for a number shown on a chart: tens and ones hundreds, tens, and ones thousands, hundreds, tens, and ones.			
				19. Name or write the numeral for a given number of: tens and ones hundreds, tens, and ones.			
				20. Express numbers as sums of: tens and ones hundreds, tens, and ones thousands, hundreds, tens, and ones.			

MATHEMATICS: K-3 AREA: Numeration (Cont´d)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			READING NUMBERS				
		K	Read numerals 0-20.	21. Read numerals: 0-20 0-200 0-1000.			
		1 2	Read and write numerals and number word names: 0-200 0-1000.	22. Write numerals: 0-200 0-1000.			
	X	3	Associate numerals for word names 0-1000.	23. Read and write number word names: 0-200 0-1000.			
1,2			Demonstrate an understanding of the system of whole numbers by counting and recognizing names for numbers.	24. Associate a number word name with equivalent expressions of that number. (less than 10)			
				25. Associate a number of objects with the number expressed as an addition fact. (number less than 10)			
				26. Express numbers as sums of: tens and ones hundreds, tens, and ones thousands, hundreds, tens, and ones.			

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			ORDERING NUMBERS				
		K	Order fewest to most, between, after, before.	27. Use terms before, between, and after in describing the position of objects in sequence.			
	   X	 K 1 2,3	Compare and order numbers to: twenty two hundred one thousand.	28. Order numbers to: 20 200 1000.			
1,2			Demonstrate an understanding of place value by reading and interpreting numerals and by comparing and ordering numbers.	29. Identify numbers that come just before or after a given number.			
				30. Identify numbers that are one, ten, or one hundred more or less than a given number.			
				31. Identify the greatest or least of a set of numbers.			
				32. Identify numbers that are between two given numbers.			
			MATHEMATICAL SYMBOLS				
			Recognize and use symbols:	33. Complete a number sentence by providing the missing symbol(s). (Ex. 5 3 = 2 5 - 3 = 2)			
		1	+, -, =, , , ( )				
		2	+, -, =, , , ( ), x				
		3	+, -, =, , , ( ), x, -				

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			ROUNDING NUMBERS				
	X6	3	Round numbers to nearest ten and hundred.	34. Round a two-digit number to the nearest ten.			
				35. Round a three-digit number to the nearest ten or hundred.			
			ODD AND EVEN NUMBERS				
		2	Recognize odd and even numbers.	36. Identify numbers as odd or even.			
		3	Recognize odd and even numbers and relationships to multiplication and divisibility.				
2			Demonstrate an understanding of the fundamental operations and their properties.				
			ROMAN NUMERALS				
		3	Write and use Roman numerals to L.	37. Write the Arabic numerals for Roman numerals to L and vice versa.			

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			ORDINAL NUMBERS				
1,2			Demonstrate an understanding of place value by reading and interpreting numerals and by comparing and ordering numbers.				
			Use ordinal numbers:	38. Use ordinal numbers to describe an object´s relative position in a sequence:			
		K	first through fifth	first through fifth			
		1	first through twelfth	first through twelfth			
		2	first through twentieth	first through twentieth			
		3	first through hundredth.	first through hundredth.			

MATHEMATICS: K-3 AREA: Addition

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			BASIC FACTS				
		K	Attain addition readiness.	1. Look at and combine groups of sets.			
		1	Add one-digit numbers to sums of 18, (vertical and horizontal forms).	2. Verbalize the addition process by combining sets to tell how many.			
		1	Begin single column addition of one-digit numbers.	3. Use manipulatives to solve simple addition problems.			
		1,2	Use number line to add.	4. Name or write the sums for basic addition facts.			
		3	Extend concept of number line.	5. Identify and demonstrate an understanding of addition fact families. (Ex. 3 + 2 = 5, 4 + 1 = 5, 5 + 0 = 5)			
		1	Recognize addition fact families.				
		2	Identify members of addition fact families.	6. Illustrate the addition process using a number line.			
		3	Identify and understand addition fact families.				
		3	Identify missing addends in addition facts.				
1,2			Addition with whole numbers.				

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			ADDING THREE-DIGITS				
1,2			Addition with whole numbers.	7. Add three one-digit addends.			
		2	Add three addends of no more than two digits.	8. Add three addends of no more than two digits. (no regrouping)			
	X	3	Add using three addends (one-digit sums up to 27).	9. Add more than three addends.			
		3	Continue to work with column addition.				
			CHECKING ADDITION				
		2	Read to check addition.	10. Use various methods to check addition problems. (commutative and associative properties)			
		3	Recognize and locate calculation errors in addition.	11. Locate calculation errors in addition problems.			
			NO RENAMING				
		1	Add two-digit numbers without regrouping.	12. Solve two- and three-digit problems to 999 with no regrouping. (horizontal and vertical)			

MATHEMATICS: K-3

AREA: Addition (Cont´d)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			NO RENAMING (Cont´d)				
		2	Add two- and three-digit numbers to sums of 1000 without regrouping. (vertical and horizontal forms)				
	X	3	Add numbers up to and including three digits without regrouping. (sum not to exceed 999)				
1,2			Addition with whole numbers.				
			RENAMING				
		2	Add two- and three-digit numbers to sums 1000 with regrouping. (vertical and horizontal form)	13. Solve two- and three-digit problems to 1000 with regrouping. (horizontal and vertical form)			
	X	3	Add numbers up to and including three digits with regrouping. (sum not to exceed 999)				
2		2	Addition with whole numbers.				

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			NUMBER SENTENCES				
		2	Write and solve simple number sentences.	14. Identify a number sentence appropriate to solving an addition problem.			
		3	Extend concept of number sentences.	15. Write a number sentence from a vertical addition problem.			
1,2			Solve problems and express as number sentences.	16. Write a number sentence from a story problem.			
			PROPERTIES				
		1	Use basic commutative and associative concepts.	17. Name the sum when zero is an addend.			
		2,3	Use commutative and associative concepts.	18. Name the missing addend in an addition sentence in which the addends have been regrouped. (associative)			
		1	Recognize the role of zero in addition.	19. Name the missing addend in an addition sentence in which the addends have been reordered. (commutative)			
		2	Begin to understand the zero in addition.				
		3	Understand role of zero in addition.				
1,2			Apply properties of addition.				

MATHEMATICS: K-3 AREA: Subtraction

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			BASIC FACTS				
		K	Attain subtraction readiness.	1. Verbalize the subtraction process by taking objects away from a set.			
		1	Subtract with minuends to 18. (vertical and horizontal forms)	2. Use manipulatives to solve simple story problems.			
	X	3	Subtract horizontally with minuend not to exceed 18.	3. Solve problems with minuends not to exceed 18. (horizontal and vertical)			
		1,2	Use number line to subtract.	4. Illustrate the subtraction process using a number line.			
		2	Write and solve simple number sentences.				
		3	Continue work with number sentences.	5. Write subtraction sentences after hearing or reading simple subtraction problems.			
		3	Understand the role of zero in subtraction.	6. Solve problems with zero as the subtrahend.			
1,2			Subtraction with whole numbers.				
			CHECKING SUBTRACTION				
		1	Recognize subtraction as inverse of addition.	7. Use addition to check the answers to completed subtraction problems.			

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			CHECKING SUBTRACTION (Cont´d)				
		2	Check answer to subtraction by adding subtrahend to difference to obtain minuend.	8. Locate calculation errors in subtraction problems.			
	X	3	Recognize and locate calculation errors in subtraction.				
			NO REGROUPING				
		1	Subtract two-digit numbers without regrouping.	9. Solve subtraction problems involving one-, two-, and/or three-digit numbers without regrouping.			
		2	Subtract two- and three-digits with minuends to 100 without regrouping. (horizontal form minuend not to exceed 18)				
	X	3	Subtract numbers up to and including two digits without regrouping.				
1,2			Subtraction with whole numbers.				

MATHEMATICS: K-3 AREA: Subtraction (Cont´d)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			REGROUPING				
		2	Subtract two- and three-digits with minuends to 100 with regrouping. (horizontal form minuend not to exceed 18)	10. Solve subtraction problems involving one-, two-, and/or three-digit numbers with minuends to: 100 1000 (with regrouping).			
	X	3	Subtract numbers up to and including two-digits, with regrouping.				
2			Subtraction with whole numbers.				

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			PROPERTIES				
		2	Understand and use commutative concept.	1. Name the product when zero (0) or one (1) is used as a multiplier.			
		3	Understand and use commutative and associative concepts.	2. Name the missing factor in a multiplication problem in which the factors have been reordered or regrouped.			
		3	Understand the role of one (1) and zero (0) in multiplication.				
			BASIC FACTS				
		2	Multiply one-digit numbers by 2, 3, and 5.	3. Demonstrate an understanding of basic multiplication facts.			
	X	3	Multiply using facts up to and including five times nine.	4. Multiply using multipliers of one digit and multiplicands of: two digits three digits (with or without regrouping).			
2		2	Recognize multiplication as repeated addition.				
		2	Use number line to show multiplication as repeated addition.				
		3	Extend use of number line.				

MATHEMATICS: K-3 AREA: Multiplication (Cont´d)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			BASIC FACTS (Cont´d)				
		3	Recognize number patterns in multiplication.				
		3	Identify missing factors from a basic multiplication fact.				
2			Multiply with whole numbers.				
			EXTENSION				
	X	3	Multiply using multipliers of one digit and multiplicands of not more than two digits.				
		3	Extend multiplication to three-digit multiplicand with one-digit multipliers with or without regrouping.				

MATHEMATICS: K-3 AREA: Division

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			BASIC FACTS				
		2	Separate objects into equivalent sets.	1. Separate sets of objects into equivalent subsets in groups of 2, 3, 4, and/or 5.			
	X	3	Divide (one stage only) using a one-digit divisor and a dividend of not more than 45. (no remainder)	2. Use repeated subtraction to represent division.			
		3	Extend division to one-digit divisor and dividend of not more than 99. (no remainder)	3. Divide using a one-digit divisor and a dividend of not more than: 45 (no remainder) 45 (with remainder) 99 (no remainder).			
		3	Recognize division as inverse of multiplication.	4. Use multiplication to check division problems.			
		3	Recognize division as repeated subtraction.				

MATHEMATICS: K-3 AREA: Fractions

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
		K	Begin working with objects divided into halves.	1. Recognize that objects can be divided into fractional parts.			
			Recognize fractional parts of an object:	2. Identify the fraction represented as portions of objects:			
		1,2 3	1/2, 1/3, 1/4	1/2			
				1/4			
		2,3	2/3, 3/4				
				1/3			
		3	1/5, 1/10				
				2/3			
			Recognize fractional parts of members in a set:	3/4			
		1,2	1/2, 1/3, 1/4	1/5			
		2	2/3, 3/4	1/10			
1,2			Demonstrate an understanding of fractional parts and the ability to name and interpret unit fractions.	3. Identify the fractional parts of members in a set:			
				1/2			
				1/3			
				2/3			

MATHEMATICS: K-3 AREA: Fractions (Cont´d)

S T A N	B C T	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	B A S	S T A N	A D V
		3	Name and use fractions.	1/4			
	X6	3	Compare and order fractions with like denominators.	3/4			
		3	Write equivalent fractions.	4. Recognize combinations of fractions that make a whole.			
				5. Compare fractions with like denominators.			
				6. Order like fractions with like denominators. (Ex. smallest to largest)			
				7. Demonstrate an understanding of fractional parts of a whole by applying knowledge to realistic situations.			

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			MEASUREMENT				
		K	Develop concept of quantity: same, all, many, and few.	1. Use vocabulary to describe quantity. (Ex. same, all, many, and few)			
		K	Develop concept of linear, mass, and capacity, measurement (informal) usage rather than memorization or comparison of one system to another.	2. Recognize that objects can be measured. (Ex. heavy, heavier, shorter, and longer) 3. Use nonstandard units to measure objects.			
		1	Associate customary units with linear measure (foot, inch), capacity (quart, pint), mass (pound) and temperature (degrees Fahrenheit).	4. Recognize and use the following measurements: inch foot quart pint gallon pound ounce degree (Fahrenheit, Celsius) centimeter millimeter liter gram kilogram.			
		2	In the customary system measure yard, foot, and inch; gallon, quart, pint; pound; and degrees Fahrenheit.				
	X	3	Measure distances by use of a ruler to the nearest one-half inch and to the nearest centimeter.	5. Use a ruler to measure distances to the nearest one-half inch and nearest centimeter.			

MATHEMATICS: K-3 AREA: Time, Measurement, and Money (Cont´d)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			MEASUREMENT (Cont´d)				
		1	Associate metric units with linear measure (meter and centimeter), capacity (liter), mass (kilogram) and temperature (degrees Celsius).	6. Measure capacities in whole or half units. 7. Look at an object and estimate the unit of measurement to be used. (customary and metric)			
		2	In the metric system measure meter, decimeter, and centimeter; liter; kilogram; and degrees Celsius.	8. Identify the temperature (Celsius and Fahrenheit) of: boiling water normal body temperature.			
	X	3	Measure capacities in whole and half units.	9. Solve simple word problems involving: customary measurement metric measurement.			
		2	Estimate measures to nearest meter, decimeter, centimeter, yard, foot, and inch.	10. Read a thermometer in degrees Celsius and Fahrenheit.			
		3	Extend ability to estimate measures in customary and metric systems.				
		2	Recognize the symbols m, dm, cm; in., ft., yd.; qt., gal., pt.; g, kg; oz. and lb.				

MATHEMATICS: K-3 AREA: Time, Measurement, and Money (Cont´d)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			MEASUREMENT (Cont´d)				
		3	Recognize symbols in feet, yard, meter, decimeter, centimeter; quart, gallon, pint, liter; ounce, pound, gram, kg.				
		3	Extend knowledge of temperature measures to include freezing and boiling points of water, and normal body temperature in both customary and metric systems.				
		2	Begin solving simple word problems involving measures in both systems.				
		3	Solve problems involving measures in both systems.				
		3	Develop measurement precision.				
1,2			Demonstrate an understanding of the principals of geometry and measurement.				

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			CLOCK TIME				
		1	Recognize hour and half-hours.	11. Tell time on circular or digital clock to: 1/2 hour 1/4 hour.			
		2	Read circular and digital clock to 1/2 hour, 1/4 hour, and hour.	12. Solve problems involving elapsed times in 15, 30, or 60 minute increments.			
	X	3	Read time to 1/2 and 1 hour on circular and digital clocks.	13. Determine the difference in the time on two clocks.			
		3	Recognize and determine elapsed time in 15, 30, and 60 minute increments.				
1,2			Demonstrate an understanding of the principles of geometry and measurement.				
			CALENDAR TIME				
		K	Become familiar with divisions of the day, days of the week, months, and seasons of the year.	14. Identify morning, afternoon, and night. 15. Name and identify in sequence: days of the week months of the year.			
		1	Learn months of the year and days of the week.				

MATHEMATICS: K-3 AREA: Time, Measurement, and Money (Cont´d)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			CALENDAR TIME (Cont´d)				
		2	Extend understanding of days, weeks and months of the year.	16. Use a monthly calendar to identify specified days or dates.			
	X	3	Use and write month of year and days of week.				
1,2			Demonstrate an understanding of the principles of geometry and measurement.				
			MONEY				
		K	Identify penny, nickel, dime, quarter, half-dollar, and dollar bill.	17. Identify and name common U.S. coins and dollar bill.			
		1	Identify and know value of U.S. coins and dollar bill and convert coins to equivalent value.	18. Name or write the value of a set of coins and/or currency. 19. Solve problems involving money.			
		2	Recognize values of the U.S. coins and make change to one dollar.	20. Convert coins to equivalent value.			
	X	3	Identify coins and currency to five dollars and make change to one dollar.	21. Make change to one dollar using appropriate coins.			

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			MONEY (Cont´d)				
		2	Recognize decimal point in monetary expressions.				
		3	Use decimal point in monetary expressions.				
		3	Solve problems involving money.				
1,2			Demonstrate an understanding of the principles of geometry and measurement.				
			PERSONAL DATA				
		K	Know own telephone number and address.	22. Know his/her own: telephone number birthdate zip code			
		1	Know own telephone number, address, and birthdate.				
		2	Know own telephone number, address with zip code, and birthdate.	23. Distinguish between and identify telephone, area code, and address numbers.			
	X	3	Identify telephone, area code, zip code, and address numbers.				

MATHEMATICS: K-3 AREA: Geometry

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			SHAPES, LINES, ANGLES, ETC.				
		K	Use positional terms - inside, outside, on; before, after, between, and beside.	1. Use vocabulary to describe position. (Ex. inside, outside, on, before, after, between, and beside)			
		K	Recognize shapes - square, rectangle, triangle, and circle.	2. Recognize and name: square rectangle triangle circle.			
		1	Recognize and name shapes - square, rectangle, triangle, and circle.				
		2	Recognize and name shapes - square, rectangle, triangle, and circle.	3. Recognize simple congruent shapes and figures.			
		3	Recognize triangle, circle, square, and rectangle.	4. Recognize and name: lines line segments rays angles polygons lines of symmetry.			
		2	Understand conditions for congruence of simple shapes.				
		3	Recognize congruent shapes and figures.				
		1	Recognize lines and line segments.	5. Calculate the perimeter of a square and/or rectangle.			
		2	Recognize and name line and line segments.	6. Find the area of plane figures by counting square units.			

MATHEMATICS: K-3 AREA: Geometry (Cont´d)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			SHAPES, LINES, ANGLES, ETC., (Cont´d)				
		3	Recognize and use lines and line segments.	7. Identify and name the solid figures: cone cube sphere.			
		3	Become familiar with angles, right angles, polygons, and lines of symmetry.	8. Identify cube as a unit of volume.			
	X6	3	Calculate perimeter of square and rectangle by adding sides.				
		3	Identify cube as unit of volume.				
	X6	3	Find area of a figure by counting square units.				
1,2			Demonstrate an understanding of the principles of geometry and measurement.				
			GRAPHS				
		K	Interpret pictographs.	9. Interpret graphs using real objects.			

MATHEMATICS: K-3

AREA: Geometry (Cont´d)

S T A N	B C T	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	B A S	S T A N	A D V
			GRAPHS (Cont´d)				
		1	Interpret pictographs and simple bar graphs.	10. Interpret information on a: pictograph bar graph line graph circle graph map chart. (Ex. find the frequency of each category, compare the frequency of each category)			
		2	Interpret pictographs and simple bar graphs.				
	X	3	Read and interpret pictographs and bar graphs.				
		2	Interpret and construct simple line graphs.	11. Use information to construct a: line graph bar graph circle graph.			
	X6	3	Interpret and construct bar, line, and circle graphs.				
		3	Read and interpret maps and charts.				
2			Demonstrate the ability to read and interpret pictographs and single bar graphs.				

MATHEMATICS: K-3 AREA: Applications

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
		1	Formulate story problems and choose an operation (addition or subtraction) to use in solving the problems.	1. Compose and solve simple story problems. 2. Solve word problems involving addition, subtraction, and/or multiplication.			
		2	Formulate and solve story problems using combining and separating operations.	3. Determine the necessary operation needed to solve a word problem.			
	X	3	Select operation to use in solving a given problem (addition, subtraction, multiplication).	4. Identify the information needed to solve a word problem.			
		3	Solve problems involving more than one operation.				
		3	Identify missing or unnecessary information in word problems.				

MATHEMATICS
CURRICULUM GUIDE
PART II — GRADES 4-6

ALABAMA STATE DEPARTMENT OF EDUCATION
Wayne Teague
State Superintendent of Education

DIVISION OF STUDENT INSTRUCTIONAL SERVICES
Eldon D. Johnson
Director
Kennith S. Blankenship
Assistant Director
Richard Causey
Assistant Director

CURRICULUM DEVELOPMENT SECTION
James H. Smith, Jr.
Project Director

MATHEMATICS 4-6

Table of Contents

PAGE

NUMERATION: READING, ORDERING, COMPARING NUMBERS (pages 162 - 193)

1. Read, write, order, and compare numbers to billions. -- 162 - 167
2. Identify numbers between two given numbers up to and including hundred thousands. ------------- 162 - 167
3. Identify numbers that are one hundred more or less than a given number. ----------------------- 162 - 167
4. Identify the number that is one thousand more or less than a given number. ------------------- 162 - 167
5. Identify the middle number in a five member group up to and including hundreds. -------------- 162 - 167
6. Associate a numeral, word name, or numerical expression with an equivalent expression. -------- 162 - 167
7. Identify groups of numerals as having all even, odd, or both even and odd numbers. ------------ 168 - 169
8. Identify groups of numerals as having all prime, composite or both prime and composite numbers. -- 170 - 173
9. Find the prime factors of numerals. -- 170 - 173
10. Determine the value of a numerical expression written in exponential form. ------------------- 170 - 173
11. Factor numerals and write factors in exponential form. --------------------------------------- 170 - 173
12. Find the least common multiple and greatest common factor. ----------------------------------- 174 - 177
13. Name the missing members in a number pattern. -- 178 - 179
14. Verbalize the process by which a number pattern was originated. ------------------------------ 178 - 179
15. Name the missing members in a series of related objects. ------------------------------------- 178 - 179
16. Write the Arabic numeral for Roman numerals and vice versa: C, D, M. ------------------------- 180 - 182
17. Use ordinal numbers to describe an object's relative position in a sequence. ----------------- 183 - 184
18. Round numerals to the nearest ten, hundred, and/or thousand. --------------------------------- 185 - 186
19. Identify the place value of any digit in a numeral. -- 187 - 191
20. Name the numeral for any number expressed in expanded notation. ------------------------------ 187 - 191
21. Name numerals for numbers expressed as thousands, hundreds, tens, and/or ones. --------------- 187 - 191
22. Write numerals in expanded notation. --- 187 - 191
23. Complete a number sentence by providing the missing symbol(s). ------------------------------- 192 - 193
24. Use numbers and symbols to write mathematical expressions describing realistic situations. -- 192 - 193

322

323

MATHEMATICS 4-6

Table of Contents

PAGE

OPERATIONS WITH WHOLE NUMBERS (pages 194 - 217)

1. Demonstrate a knowledge of basic addition, subtraction, division, and multiplication facts by solving problems on a timed test. ---------- 194 - 195; 215 - 217
2. Add and subtract whole numbers. ---------- 196 - 197; 215 - 217
3. Multiply and divide whole numbers. ---------- 198 - 204; 215 - 217
4. Name the missing factor in a multiplication sentence. ---------- 198 - 204
5. Multiply by multiples of 10, 100, and 1000. ---------- 198 - 204
6. Use commutative property of addition and multiplication to check answers to problems. ---------- 198 - 204; 205 - 206
7. Use associative property of addition and multiplication to check problems with three or more addends and/or three or more factors. ---------- 205 - 206
8. Round numbers to estimate sums, differences, products, and quotients. ---------- 207 - 208
9. Select the most reasonable answers to addition, subtraction, division, and/or multiplication problems. ---------- 207 - 208
10. Recognize and locate calculation errors in computation problems. ---------- 196 - 197
11. Find averages. ---------- 209 - 210
12. Write an addition sentence using a given subtraction sentence and vice versa. ---------- 211 - 212; 213 - 214
13. Write a division sentence using a given multiplication sentence and vice versa. ---------- 211 - 212
14. Solve simple horizontal equations. ---------- 213 - 214

FRACTIONS (pages 218 - 239)

1. Name the designated part of a region or set as a common fraction. ---------- 218
2. Name the relationship between the lengths of two line segments as a common faction. ---------- 218
3. Rename mixed numbers as improper fractions and vice versa. ---------- 219 - 222
4. Identify a fraction as a proper or improper fraction. ---------- 219 - 222
5. Reduce fractions to simplest terms. ---------- 223 - 224
6. Find the least common denominator. ---------- 174 - 177
7. Find equivalent fractions. ---------- 174 - 177
8. Order and compare fractions. ---------- 174 - 177
9. Use comparative terms and symbols to compare fractions. ---------- 174 - 177

MATHEMATICS 4-6

Table of Contents

PAGE

FRACTIONS (pages 218 - 239) (Cont´d)

10. Add and subtract fractions, mixed numbers, and/or whole numbers. 225 - 235
11. Solve word problems involving addition and/or subtraction of fractions. 225 - 235
12. Multiply and divide fractions, mixed numbers, and/or whole numbers. 225 - 235
13. Convert fractions to decimals. 236 - 237
14. Estimate sums, differences, products, and/or quotients of fractions. 238 - 239
15. Solve word problems involving fractions. 225 - 235

DECIMALS (pages 240 - 253)

1. Identify the place value for a given digit in a decimal fraction or a mixed decimal through thousandths. 240 - 241
2. Write the numeral for a given whole number and decimal fraction. 242 - 243
3. Compare and order decimals and/or mixed numbers. 244
4. Find equivalent decimals and mixed numbers. 242 - 243
5. Use comparative terms and symbols to compare decimals. 244
6. Convert a decimal to a fraction and vice versa. 245 - 246
7. Add and subtract decimal numbers, mixed numbers, and/or whole numbers. 247 - 250
8. Multiply and divide decimal numbers, mixed numbers, and/or whole numbers. 247 - 250
9. Solve word problems involving decimals. 247 - 250
10. Estimate the answer to problems involving decimals. 251 - 252
11. Find the average of decimal numbers and/or mixed decimals. 253
12. Round decimal numbers or mixed decimals. 251 - 252

RATIO, PROPORTION, AND PERCENT (pages 254 - 261)

1. Use ratios to compare numbers. 254 - 256
2. Use ratio symbols to express two numbers. 254 - 256
3. Find equivalent ratios. 254 - 256
4. Determine proportions. 254 - 256

MATHEMATICS 4-6

Table of Contents

PAGE

RATIO, PROPORTION, AND PERCENT (pages 254 - 262) (Cont´d)

5. Solve a proportion in which a numerator or denominator is unknown. ---------- 254 - 256
6. Understand the vocabulary related to percents: percent, percentage, percent symbol (%). ---------- 257 - 261
7. Change a percent to a decimal and vice versa. ---------- 257 - 261
8. Change a fraction to a percent and vice versa. ---------- 257 - 261
9. Calculate the percent and percentage of a number. ---------- 257 - 261
10. Solve word problems using percents. ---------- 257 - 261

TIME, MEASUREMENT, AND MONEY (pages 262 - 306)

1. Write and read mass/weight symbols for customary and metric measures. ---------- 262 - 264
2. Weigh objects and report mass/weight in metric and customary units. ---------- 262 - 264
3. Convert mass/weight within metric and customary measures. ---------- 265 - 269
4. Solve word problems involving mass/weight units of measure. ---------- 270
5. Solve word problems involving conversion of mass/weight units. ---------- 270
6. Write and read capacity symbols for metric and customary systems. ---------- 271
7. Measure capacities and report in metric and customary units of measure. ---------- 271
8. Convert capacities with metric and customary units of measure. ---------- 265 - 269
9. Solve word problems involving capacity. ---------- 270
10. Solve word problems involving conversion of capacity units. ---------- 270
11. Select the appropriate unit of measure for measuring a specified object. ---------- 272 - 273
12. Write and read the symbols for customary and metric measures of length. ---------- 274 - 275
13. Measure lengths and report in metric and customary units. ---------- 274 - 275
14. Add and subtract problems involving linear measurement. ---------- 276 - 277
15. Estimate the length of an object given the unit of measurement. ---------- 274 - 275
16. Convert linear/length with metric and customary units of measure. ---------- 265 - 269
17. Solve word problems involving linear units of measurement. ---------- 270
18. Solve word problems involving conversion of linear units. ---------- 270
19. Read and write money values. ---------- 278 - 279
20. Write fractional parts of a dollar in decimal form. ---------- 278 - 279

MATHEMATICS 4-6

Table of Contents

PAGE

TIME, MEASUREMENT, AND MONEY (pages 262 - 306) (Cont´d)

21. Add and subtract money values. ---------- 280 - 282
22. Multiply and divide money values. ---------- 280 - 282
23. Name the value of a set of coins and/or bills. ---------- 283 - 284
24. Determine and make change. ---------- 283 - 284
25. Solve word problems involving money. ---------- 280 - 282
26. Determine sales tax on a purchase using a sales tax table. ---------- 285 - 287
27. Calculate total price of an item that has been discounted by a percentage. ---------- 288 - 290
28. Calculate simple interest. ---------- 291 - 293
29. Compute hourly wages with no deductions. ---------- 294 - 295
30. Use comparative shopping skills in solving consumer problems. ---------- 296 - 298
31. Tell time using a circular or digital clock. ---------- 299 - 300
32. Determine elapsed time. ---------- 299 - 300
33. Use conversion facts of time measures to solve word problems. ---------- 299 - 300; 301 - 303
34. Solve word problems involving time zones. ---------- 299 - 300
35. Solve problems involving weeks, months, and/or days. ---------- 301 - 303
36. Name the boiling point of water and normal body temperature in degrees Celsius and Fahrenheit. ---------- 304 - 306

GEOMETRY (pages 307 - 318)

1. Recognize, name, and illustrate squares, rectangles, circles, radius, diameter, circumference, triangles, trapezoids, angles, right angles, acute angles, obtuse angles, points, line segments, rays, parallel lines, perpendicular lines, intersecting lines. ---------- 307 - 309
2. Use instruments to increase precision in drawing geometric figures. ---------- 310 - 311
3. Recognize, name, and illustrate cubes, rectangular solids, spheres, cylinders, cones. ---------- 307 - 309
4. Identify parts of a solid figure. ---------- 307 - 309
5. Find the area of a square, rectangle, circle, triangle. ---------- 312 - 315
6. Find the volume for a cube, rectangular solid. ---------- 316 - 317
7. Solve word problems involving area and/or perimeter. ---------- 318

MATHEMATICS 4-6

Table of Contents

PAGE

GRAPHS: MAPS AND CHARTS (pages 319 - 335)

1. Use number pairs to locate and plot points on a grid. ---------- 319 - 322
2. Use frequencies of categories on graphs to determine totals or make comparisons. ---------- 323 - 329; 334 - 335
3. Use information to construct graphs. ---------- 323 - 329; 334 - 335
4. Find the location of a specified place on a grid. ---------- 319 - 322
5. Give the coordinates of a location on a map. ---------- 330 - 333
6. Solve problems using information provided on graphs, maps, charts, and diagrams. ---------- 323 - 329; 330 - 333; 334 - 335
7. Interpret information on graphs, tables, maps, charts, and diagrams. ---------- 323 - 329; 330 - 333; 334 - 335

STATISTICS AND PROBABILITY (pages 336 - 338)

1. Find the mean, median, and mode of a group of numbers. ---------- 336 - 338

APPLICATIONS (pages 339 - 341)

1. Determine if sufficient information is given to solve a problem. ---------- 339 - 341
2. Solve a word problem using one or more operations. ---------- 339 - 341
3. Identify and solve the number sentence appropriate to solving a two-step or or multi-step word problem. ---------- 339 - 341
4. Solve process problems which require a table, a chart, a diagram and/or some other type of solution. ---------- 323 - 329

ORIGINAL SOURCES AND STUDENT OUTCOMES ---------- 342 - 384

AREA: NUMERATION

GROUPING: READING NUMBERS

OUTCOMES:
1. Read, write, order, and compare numbers to billions.
2. Identify numbers between two given numbers up to and including hundred thousands.
3. Identify numbers that are one hundred more or less than a given number.
4. Identify the number that is one thousand more or less than a given number.
5. Identify the middle number in a five member group up to and including hundreds.
6. Associate a numeral, word name, or numerical expression with an equivalent expression.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Identify place value to the millions period.
2. Recognize relationships of periods:
   a) Beginning on the right, three consecutive places constitute a period.
   b) Commas separate periods (billions, millions, thousands, ones).

Steps to Success

1. Stress that the three digits in each period are read as if they stand alone. (Each period contains three places, for example: hundreds, tens, ones.)
2. Help students recognize that we read numbers from left to right and place commas from right to left.

ACTIVITY 1 - OUTCOMES 1 and 6

Copy the following place value chart on the chalkboard.

Billions			Millions			Thousands			Ones		
hundred billions	ten billions	billions	hundred millions	ten millions	millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones

Review with students the periods on the chart pointing out that each period contains three digits (places): ones, tens, and hundreds of that period.

Write a list of numbers on the chalkboard using various forms: numbers in word form, numbers using digits and words, and the standard form.

Example: fifty-seven thousand, seven hundred ninety
87 billion, 385 million, 735 thousand, 238,
86, 345, 408

Review reading these numbers with students. After the review, have students come to the board and write the numbers in the place value chart using only digits. Remind students a zero must be used to show that there are no digit(s) in a particular period.

ACTIVITY 2 - OUTCOMES 3 and 4

Use a place value chart as in Activity 1 and write a six-digit number in it.

Example:

Billions			Millions			Thousands			Ones		
hundred billions	ten billions	billions	hundred millions	ten millions	millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones
						3	5	3	2	1	6

ACTIVITY 2 - OUTCOMES 3 and 4 (Cont´d)

Ask students to write on the chart the number that is one thousand less than and the number that is one thousand more than 353,216.

Example:

Billions			Millions			Thousands			Ones			
hundred billions	ten billions	billions	hundred millions	ten millions	millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones	
						3	5	4	2	1	6	1000 MORE
						3	5	3	2	1	6	
						3	5	2	2	1	6	1000 LESS

Point out that only the digit in the thousands column changes. All other digits remain the same. After students have practiced writing numbers that are one thousand less than and one thousand more than a given number, let them pick from three choices the number that is one thousand less than or one thousand more than a given number from a group of number.

Example: Circle the number that is one thousand more than the given number.

Given number = 46,321

Choices = 35,421
[✓ 47,321]
41,231

This same process can be used to identify numbers one hundred less than and one hundred more than a given number.

ACTIVITY 3 - OUTCOME 5

Use a place value chart similar to the one used in Activities 1 and 2. List 5 numbers on the board and ask students to place the numbers on the chart from least to greatest. After ranking the numbers, ask the students to circle the number that is in the middle position.

Example: Order numerals on the chart from least to greatest. Circle the middle numeral.

List:
563
74
5
100
210

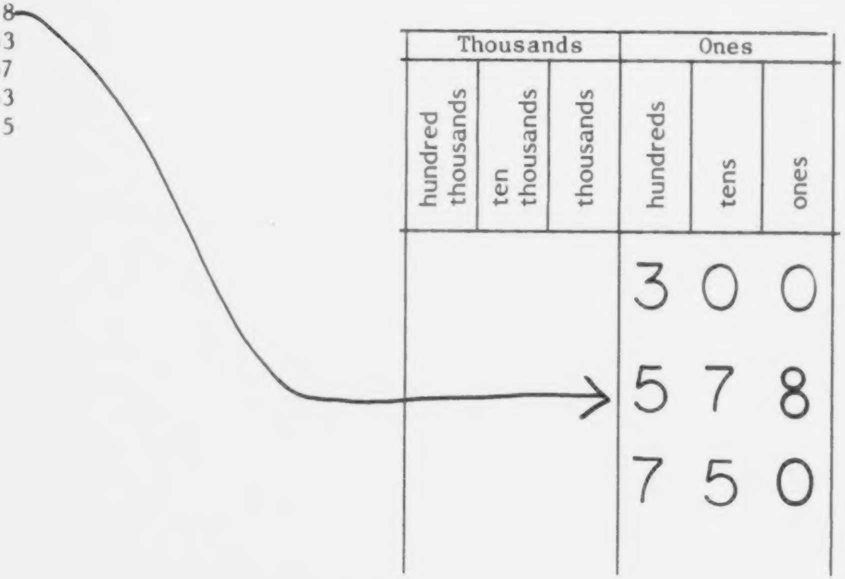
Thousands			Ones		
hundred thousands	ten thousands	thousands	hundreds	tens	ones
					5
				7	4
			1	0	0
			2	1	0
			5	6	3

ACTIVITY 4 - OUTCOME 2

Use a place value chart similar to the ones used in Activity 1, 2, and 3. List 5 numbers on the board and 2 numbers on the place value chart. Ask students to find one number from the five-number list that falls between the 2 numbers on the place value chart. After finding the number, ask students to place the number between the 2 numbers on the place value chart.

Example: Find the number that comes between the two numbers on the chart and place that number on the chart.

List:
578
3,433
56,767
9,563
10,645


Thousands
Ones
hundred thousands
ten thousands
thousands
hundreds
tens
ones
3 0 0
5 7 8
7 5 0

AREA: NUMERATION

OUTCOME: 7. Identify groups of numerals as having all even, odd, or both even and odd numbers.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know the definition of a whole number.
2. Generate simple multiples of numbers.
3. Divide a multi-digit number by one-digit divisors.

Steps to Success

1. A whole number is even if it has 0, 2, 4, 6 or 8 in the ones place.
2. Any whole number that can be divided by 2 without a remainder is an even number.
3. An odd number is any whole number that has a reminder if it is divided by 2.
4. A whole number is odd when it has 1, 3, 5, 7 or 9 in the ones place.

ACTIVITY 1 - OUTCOME 7

Explain to students that if a number has a digit that is a multiple of 2 in the ones column, that number is even. If not, that number is odd.

Ask students to look at an example of an even number such as 6. Point out that the multiples of 2 are 2, 4, 6, 8, 10, etc. Explain that 6 is a multiple of 2, and therefore, is an even number.

ACTIVITY 1 - OUTCOME 7 (Cont´d)

Have students look at examples of odd numbers such as 57. Point out that 7 is the digit in the ones column. Ask leading questions such as: "Is 7 a multiple of 2?" Students need to recognize that 7 is not a multiple of 2, and therefore, is an odd number.

Give students a list of numerals and ask them to place a capital E beside even numbers and a capital O beside odd numbers.

Example:
5 - O
8 - E
50 - E
36 - E
47 - O

Let students explain their answers. The teacher may need to point out that all numbers which have a zero (0) in the ones column are even.

ACTIVITY 2 - OUTCOME 7

Give students groups of numerals. Ask students to identify the group as containing all even numbers, all odd numbers, or even and odd numbers.

Example:

35	62	95
42	94	63
67	168	727
84	372	441
even and odd	even	odd

MATHEMATICS
4 - 6

AREA: NUMERATION

OUTCOMES:
8. Identify groups of numerals as having all prime, composite, or both prime and composite numbers.
9. Find the prime factors of numerals.
10. Determine the value of a numeral expression written in exponential form.
11. Factor numerals and write factors in exponential form.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Identify factors of numbers.
2. Know that a number is divisible by its factors.
3. Know that any whole number has factors of itself and 1.

Steps to Success

After completing the exercises which follow, students should know:

1. that a prime number has only two factors (itself and 1);
2. that the number 1 is neither composite nor prime;
3. that the number 2 is the first prime number and is the only even prime number;
4. that a composite number is greater that 1 and has more that two factors;
5. that the number 9 is the first odd composite number;
6. that the first step in determining if a number is composite or prime is to list its factors;
7. that a composite number can be expressed as a product of prime factors; and
8. that when a factor is repeated, it can be expressed in exponential form.

ACTIVITY 1 - OUTCOME 8

Have students identify factors for several numbers by using divisibility tests. They should list the factors in order. (Divisors and quotients are factors.)

48 $\begin{array}{r} 24 \\ 2\overline{)48} \end{array}$ $\begin{array}{r} 16 \\ 3\overline{)48} \end{array}$ $\begin{array}{r} 12 \\ 4\overline{)48} \end{array}$ $\begin{array}{r} 8 \\ 6\overline{)48} \end{array}$

Example: 48 - 2, 3, 4, 6, 8, 12, 16, 24

After completing several sets, explain that all numbers that have only two factors--themselves and 1--are prime numbers. Numbers that have more that two factors are composite.

Write a list of numbers on the chalkboard. Have students come to the board and determine by dividing whether a number is prime or composite. Have students explain why.

ACTIVITY 2 - OUTCOME 8

Give students practice in identifying prime and composite numbers.

List the numbers 1-20 on the chalkboard.

Example: ~~1~~ 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

First, cross out the numeral 1 and explain that it only has one factor; prime numbers must have two factors. Then ask ask students to identify prime numbers remembering that a prime number has two factors - itself and the number one. As prime numbers are identified, circle each. Explain that the numbers not circled are composite numbers. Ask students to tell why each uncircled number is a composite number.

Example: ~~1~~ ② ③ 4 ⑤ 6 ⑦ 8 9 10 ⑪ 12 ⑬ 14 15 16 ⑰ 18 ⑲ 20

ACTIVITY 3 - OUTCOME 9

Students are to find the prime factorization of several numbers. By using simple division, students can find the prime factors of a number. An explanation of the term "prime factor" would be appropriate at this time. Begin with the first prime number 2. Divide by 2, placing the quotient under the dividend.

Example:
```
2)48
 )24
```

Show students how to continue dividing by 2 until the results yield a remainder that 2 can no longer be divided into evenly.

Example:
```
2)48
2)24
2)12
2) 6
   3
```

At this point, students should divide by the next higher prime that divides evenly. In the example the number will be 3. Divide until the quotient is the number 1.

Example:
```
2)48
2)24
2)12
2) 6
3) 3
   1
```

Explain to students that the numbers on the left (divisors) are the prime factors of 48. Have students write a number sentence for 48.

Example: 48 = 2 x 2 x 2 x 2 x 3

ACTIVITY 4 - OUTCOMES 10 and 11

Students are to write exponent forms from factor forms. Begin by explaining the difference between a power and a multiple.

Example: $6 \times 8 = 48$ A multiple is the result of multiplying one number by another number.

Example: $10^2 = 10 \times 10 = 100$ A power is the number of times a number is multiplied by itself.

Demonstrate that a power can be written in the exponential form using an exponent at the top right of the number. Stress that the exponent states how many times that number is to be used as a factor. (Exponent is a counting number, not a factor.)

Example: $10 \times 10 = 10^2$ should be read, "10 to the second power"
$10 \times 10 \times 10 = 10^3$ (should be read,"10 to the third power"

Have students reverse the process and list the factors for the exponential form.

Example: $10^2 = 10 \times 10$
$10^3 = 10 \times 10 \times 10$

Refer students back to finding prime factors. Have them find the prime factors for several numbers and list them in order.

Example 1:
2)24
2)12
2) 6
3) 3
1

$2 \times 2 \times 2 \times 3$

Example 2:
2)18
3) 9
3) 3
1

$2 \times 3 \times 3$

Example 3:
2)36
2)18
3) 9
3) 3
1

$2 \times 2 \times 3 \times 3$

In example 1, the digit 2 was used as a factor 3 times. In example 2, the digit 3 was used as a factor 2 times. In example 3, the digits 2 and 3 were each used as a factor 2 times. Show students how to write these examples using exponents.

Example 1: $2 \times 2 \times 2 \times 3 = 2^3 \times 3$ Example 2: 2×3^2 Example 3: $2^2 \times 3^2$

Complete other examples and write the factors using exponential form when possible.

MATHEMATICS
4 - 6

AREA: NUMERATION
FRACTIONS

OUTCOMES: Numeration: 12. Find the least common multiple and greatest common factor.

Fractions:
6. Find the least common denominator.
7. Find equivalent fractions.
8. Order and compare fractions.
9. Use comparative terms and symbols to compare fractions.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Multiply and divide whole numbers (basic facts).
2. Generate multiples of a given number.
3. Use comparative symbols (>, <).
4. Distinguish between a numerator and denominator.
5. Determine whether a number is prime or composite.

Steps to Success

1. The least common multiple (LCM) method for determining the least common denominator is usually the most efficient method.
2. The "ball park" method where denominators are multiplied together usually yield large numbers which make reducing difficult.
3. If denominators are prime numbers, use the "ball park" method.
4. By using the LCM method, the possibility of errors is reduced and the efficiency of completing such tasks as comparing and adding unlike fractions is increased.
5. The following activities should be taught in sequential order to ensure continuity.

ACTIVITY 1 - OUTCOME - NUMERATION 12

Common Multiples

Write the numbers 6 and 8 on the chalkboard.

Example: 6 8

Multiples are the products of multiplication facts. To find the multiples of 6, one must know the basic multiplication facts.

Example: 6
6 x 1 = 6
6 x 2 = 12
6 x 3 = 18
etc.

6, 12, 18 are multiples of 6.

Lead students in finding the first 5 multiples of 6 and 8.

Example:

6	8
6 x 1 = 6	8 x 1 = 8
6 x 2 = 12	8 x 2 = 16
6 x 3 = 18	8 x 3 = 24
6 x 4 = 24	8 x 4 = 32
6 x 5 = 30	8 x 5 = 40

List the first 5 multiples of 6 and 8.

Example: 6 = 6, 12, 18, 24, 30
8 = 8, 16, 24, 32, 40

Have students look for a multiple that is common to both 6 and 8. The multiple 24 is a common multiple of 6 and 8. Extend this example and others like it to show that two numbers may have more than one multiple in common. In such cases, remind students to identify the least common multiple.

ACTIVITY 1 - OUTCOME - NUMERATION 12 (Cont'd)

Instruct students to circle the common multiple and label the numerals LCM (least common multiple).

Example: 6: 6, 12, 18, 24, 30
LCM
8: 8, 16, 24, 32, 40

If a common multiple is not found within the first 5 multiples, other multiples will be needed to find a least common multiple.

Example: 6: 6, 12, 18, 24, 30, 36, 42, 48, 54, 60
LCM
16: 16, 32, 48, 64, 80

ACTIVITY 2 - OUTCOMES FRACTIONS 6, 7, 8, and 9

Many people have two names. Sometimes, we call someone we know by a nickname. For example, we may call Jim, Slim because he is tall and thin. Slim is another name for Jim.

Fractions, like people, can be renamed. When a fraction is renamed, we say that we have found its equivalent fraction. An equivalent fraction is another name for the original fraction. Sometimes it is necessary to rename fractions when we want to compare or order fractions with unlike denominators. To compare fractions, we must find a least common denominator (LCD) for the two fractions.

To find the least common denominator (LCD) for two fractions, use the method for finding the least common multiples (LCM) as in Activity 1.

Write the fractions 2/4 and 3/10 on the board. Circle both denominators.

Example: 2/4 3/10

Beginning with the smallest denominator (4), list its first 5 multiples.

Example: 4 = 4, 8, 12, 16, 20

ACTIVITY 2 - OUTCOMES - FRACTIONS 6, 7, 8, and 9 (Cont'd)

List the first 5 multiples of 10 under the multiples of 4.

Example: 4: 4, 8, 12, 16, 20
LCD
10: 10, 20, 30, 40, 50

Circle and label the least common denominator.

List the least common denominator next to the original fractions.

Example: 2/4 = /20

3/10 = /20

Twenty (20) is the 5th multiple of the denominator 4 and the 2nd multiple of the denominator 10.

To find the equivalent numerator for 2/4, find the 5th multiple for the numerator 2.

(5th)
Example: 2 = 2, 4, 6, 8, 10
2/4 = 10/20

To find the equivalent numerator for 3/10, find the 2nd multiple for the numerator 3.

(2nd)
Example: 3 = 3, 6
3/10 = 6/20

We have found an equivalent fraction for 2/4 and 3/10 that have common denominators.

2/4 = 10/20 3/10 = 6/20

Compare and order these two fractions. Use the greater than, less than signs (<, >) to compare numerators.

Ten parts of 20 (10/20) is more than 6 parts of 20 (6/20), or 10/20 > 6/20.

AREA: NUMERATION

OUTCOMES: 13. Name the missing members in a number pattern.
14. Verbalize the process by which a number pattern was originated.
15. Name the missing members in a series of related objects.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know multiplication and addition facts.
2. Know in what order to perform operations in a number sentence.

Steps to Success

1. Understanding number patterns helps strengthen students´ understanding of other processes: addition, subtraction, multiplication, and division.

ACTIVITY 1 - OUTCOMES 13 and 14

Have students fill in the missing numbers.

a. 1, 2, 3, 4, __, 6
b. 2, 4, 6, 8, __, 12
c. 2, 5, 8, 11, __, 17

Ask students to explain their answers. Discuss number patterns.

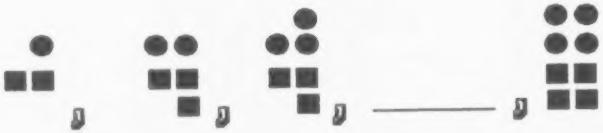
Have students fill in the missing number patterns.

a. 1 x 1, 1 x 2, _____, 1 x 4, _____
b. 1 x 2, _____, 3 x 2, 4 x 2

ACTIVITY 2 - OUTCOME 15

Have students discover a pattern using objects and fill in the missing members.

Example:



Students should be able to express the pattern as: Add one circle to the preceding members; then add one square to those members; then add one circle to those members...

AREA: NUMERATION: READING, ORDERING, COMPARING NUMBERS

OUTCOME: 16. Write the Arabic numeral for Roman numerals and vice versa: C, D, M.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know the following Roman numerals and their values.
   I = 1   V = 5   X = 10   L = 50

2. Know that the value of Roman numerals is usually the sum of the numbers represented as in the following:

```
XXVII = XX + V + II
      = 20 + 5 + 2
XXVII = 27
```

3. Know that subtraction is sometimes used to find the value of a Roman numeral. When a numeral of lesser value is placed before a numeral of greater value, the value is the difference between the two, as in the following:

```
LIX  =  L + IX                    XLIV =    XL     +   IV
     = 50 + (10 - 1)                   = (50 - 10) + (5 - 1)
LIX  = 59                         XLIV = 44
```

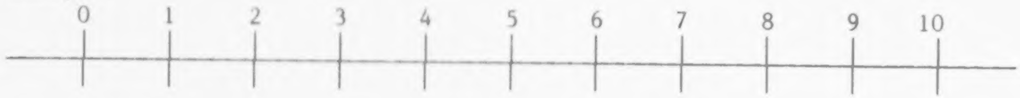
Steps to Success

1. Make sure students have an understanding of the Roman system of numeration. (Prerequisites 1, 2, 3)
2. Help students understand that the Roman numeration system does not have place value. (Try addition and subtraction.)

ACTIVITY 1 - OUTCOME 16

Draw a number line on the chalkboard with Arabic (standard) numerals.

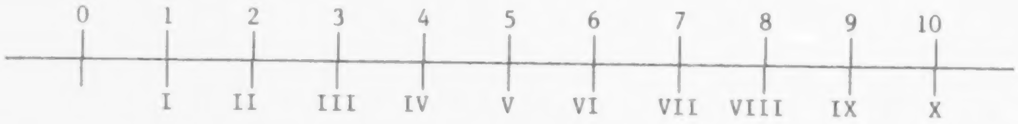
Example:


0
1
2
3
4
5
6
7
8
9
10

Point out to students that Roman numerals have no symbol for 0.

Let students fill in the bottom half of the number line with Roman numerals.

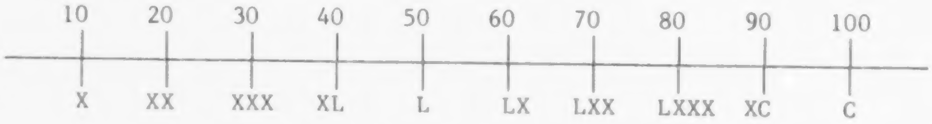
Example:


0
1
2
3
4
5
6
7
8
9
10
I
II
III
IV
V
VI
VII
VIII
IX
X

Remember to review the use of subtraction to indicate the numerals 4, 6, and 9

Use the same process for introducing "tens" in Roman numerals.

Example:


10
20
30
40
50
60
70
80
90
100
X
XX
XXX
XL
L
LX
LXX
LXXX
XC
C

After students understand how to write Roman numerals I - X (1 - 10) and X - C (10 - 100), they can write any Roman numeral I - C (1 - 100).

ACTIVITY 2 - OUTCOME 16

Introduce the Roman symbols for 100, 500, 1000.
C = 100 D = 500 M = 1000

Remind students to follow the same rules they have used previously to write 1 - 50. Have them write Roman numerals for several standard (Arabic) numerals.

Example:
1. 45 ________
2. 126 ________
3. 945 ________
4. 1920 ________

Give students a list of Roman numerals and have them write the standard numerals.

Example:
1. MCMXXII ________
2. CDIX ________
3. MDCXV ________
4. MCML ________

MATHEMATICS
4 - 6

AREA: NUMERATION

OUTCOME: 17. Use ordinal numbers to describe an object´s relative position in a sequence.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Count by rote.

Steps to Success

1. Give students many different opportunities throughout the school year to use ordinal numbers.

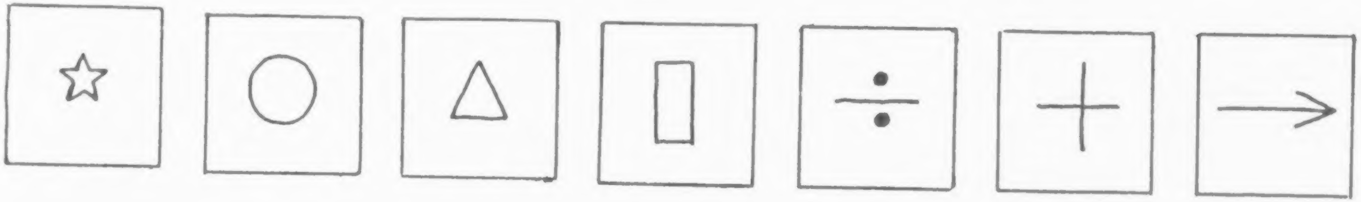
ACTIVITY 1 - OUTCOME 17

Refer to K-3, Outcome 38, Activities 1 and 2.

ACTIVITY 2 - OUTCOME 17

Draw 10 symbols such as a star, a circle, or a triangle on sheets of construction paper. Arrange the symbols in a designated order and show them to the students.

Example:



ACTIVITY 2 - OUTCOME 17 (Cont'd)

Ask students to name the position of a specific symbol. For example, say: "Ordering from left to right, in what position do you find the division symbol?" (fifth)

ACTIVITY 3 - OUTCOME 17

Provide students with a teacher-made worksheet of five (5) sets of symbols. Use the same symbols in different arrangements in each set.

Example:

1. ☆ ○ △ □ ÷ + → × >
2. △ ○ > → × ÷ □ + ☆
3. □ → ☆ + △ ○ > ÷ ×
4. + ☆ □ △ × → ÷ > ○
5. → △ ÷ + ○ > ☆ × □

Identify the position of a designated symbol in each set.

Example:

Set 1	Set 2	Set 3	Set 4	Set 5	
star dot triangle etc.	first	ninth	third	second	seventh

MATHEMATICS
4 - 6

AREA: NUMERATION: READING, ORDERING, COMPARING NUMBERS

OUTCOME: 18. Round numerals to the nearest ten, hundred, and/or thousand.

NOTES FOR THE TEACHER

Prerequisites for Students

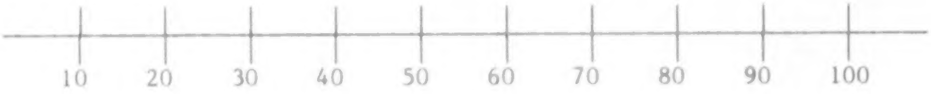
1. Round numbers to the nearest ten.

Steps to Success

1. Remind students that rounded numbers are easier to work with and easier to remember. When an exact answer is needed, rounding must not occur.
2. Remember that an error often made by students when rounding "down" is to subtract 1 from the digit in the place they are rounding. Example: 73 to 60
3. Know that mathematicians have agreed to round up when the digit to the right of the place being rounded is five (5).

ACTIVITY 1 - OUTCOME 18

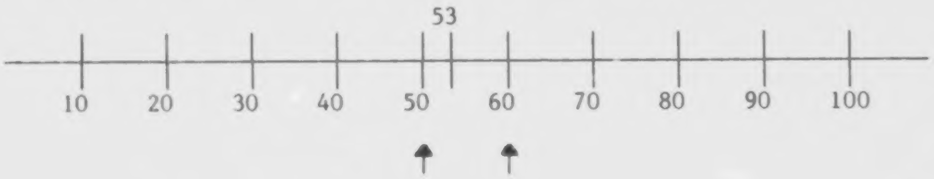
Review rounding to the nearest ten. Draw a number line on the chalkboard.



378

ACTIVITY 1 - OUTCOME 18 (Cont´d)

Have students locate a number, such as 53 on the number line. First, decide between which two multiples of ten it falls. (50 and 60) Then decide whether it is closer to 50 or 60.



(Closer to 50)

ACTIVITY 2 - OUTCOME 18

Give students a list of numbers that have been rounded.

Example: - 20 -
- 90 -
- 210 -
- 800 -

Have students list the numbers from which the given numbers (20, 90, 210, 800) could have been rounded.

Example: 15, 16, 17, 18, 19 ← 20 → 21, 22, 23, 24
85, 86, 87, 88, 89 ← 90 → 91, 92, 93. 94
205, 206, 207, 208, 209 ← 210 → 211, 212, 213, 214
750 - 799 ← 800 → 801 - 849

Extension: Repeat this activity using four-digit numbers such as 2000, 3050, 6000, and 8100.

MATHEMATICS
4 - 6

AREA: NUMERATION

OUTCOMES:

19. Identify the place value of any digit in a numeral.
20. Name the numeral for any number expressed in expanded notation.
21. Name numerals for numbers expressed as thousands, hundreds, tens, and/or ones.
22. Write numerals in expanded notation.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Recognize number names, place value names, and values.
2. Understand the concept of groups of 10.

Steps to Success

1. Explaining the arrangement of the place value chart (period names and place names) will make the activity more meaningful. For example, students should understand that the thousands place represents groups of one thousand.
2. Activity 1 works best if the place value chart is prepared for use ahead of time. Students are motivated when actively involved. The chart can also be used at any time for extra practice or review. However, a place value chart can be drawn on the chalkboard so different digits can be used.

ACTIVITY I - OUTCOME 19

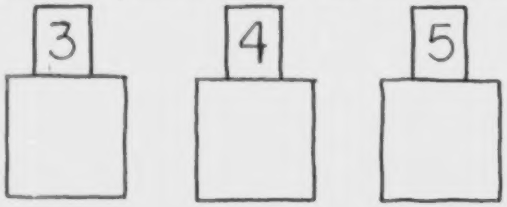
Make a place value chart on one sheet of posterboard (22" x 24").

BILLIONS			MILLIONS			THOUSANDS			UNITS		
hundred billions	ten billions	billions	hundred millions	ten millions	millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones

Use library book pockets cut into envelopes, or smaller pieces of poster board as holders for numbers under each place value name.

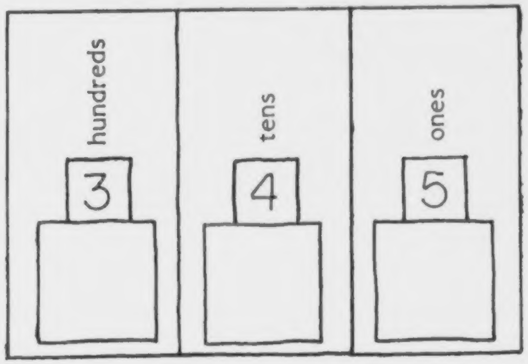
Make 5 sets of digit cards (0 -9) to use in the pockets. The cards should be longer than the pockets so the numbers will show. Popsicle sticks can be used also.

Example:



ACTIVITY 1 - OUTCOME 19 (Cont´d)

Have students make up a 3-digit number and place the digit cards in the units of a period. Show the students how the place name for each digit can be identified.



Extend this activity to cover 7-, 8-, or 9- digit numbers.

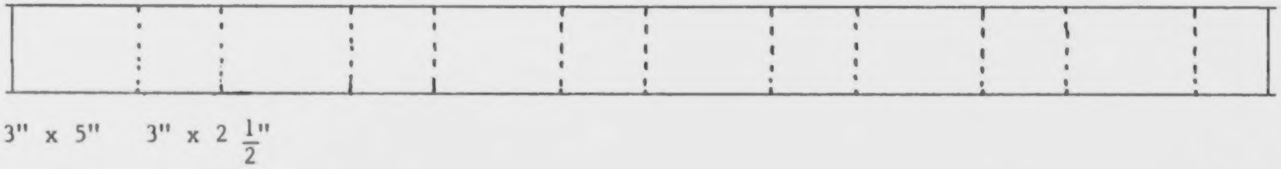
Extension: Students can make personal place value charts to aid them if they have difficulty.

ACTIVITY 2 - OUTCOMES 19, 20, 21, and 22

Prepare several expanding numeral charts for students to use to practice identifying place value of digits within a numeral.

To make the charts, use 3 x 5 index cards or paper cut to these dimensions. In order to display a 6-digit numeral, nine whole 3 x 5 cards should be used. Six whole cards and six half-cards are taped together.

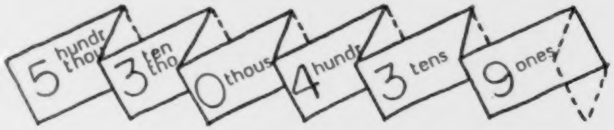
Example:



ACTIVITY 2 - OUTCOMES 19, 20, 21, and 22 (Cont'd)

After cards are taped, fold cards as shown in the diagram below.

Example:



Digits can then be written on the visible left side of the 3 x 5 card as show above. Place value names are written in the part of the cards which is hidden when the cards are folded.

Hint: In order to use this instructional aid for different numbers, laminate the cards or cover them with clear contact paper. Write with a grease pencil.

Students can use these expanding charts to practice identifying place value.

Students can then make up numbers of their own and write them in expanded form like the expanding numeral charts.

Example: 39,654 = 3 ten thousands, 9 thousands, 6 hundreds, 5 tens, 4 ones

ACTIVITY 3 - OUTCOME 19

Using a teacher-prepared worksheet, students should identify the place value of an underlined digit within a numeral.

Example:

1. 9475 - 4 hundreds
2. 346,219 - 4 ten thousands
3. 4,021,299 - 4 millions

ACTIVITY 4 - OUTCOMES 20, 21, and 22

Explain how 5,429 can be represented as a number sentence, simply by inserting plus signs between each digit and its value.

5 thousands + 4 hundreds + 2 tens + 9 ones

Show students other ways to represent 5,429 such as:

5 thousands + 4 hundreds + 2 tens + 9 ones
5000 + 400 + 20 + 9
(5 x 1000) + (4 x 100) + (2 x 10) + (9 x 1)

Use larger numbers to show that the process is the same.

419,725

4 hundred thousands + 1 ten thousand + 9 thousands + 7 hundreds + 2 tens + 5 ones
400,000 + 10,000 + 9,000 + 700 + 20 + 5
(4 x 100,000) + (1 x 10,000) + (9 x 1,000) + (7 x 100) + (2 x 10) + (5 x 1)

The role of zero as a place holder should be reviewed and an example shown.

Give students numerals to expand in the three ways shown above.

ACTIVITY 5 - OUTCOMES 20, 21, and 22

Reverse the process followed in Activity 4. Give students expanded numerals written in any of the 3 ways shown above. Have students supply the numeral represented.

Examples: 30,000 + 1,000 + 700 + 50 + 2 = 31,752

(4 x 1000) + (5 x 10) + (7 x 1) = 4,057

6 million + 6 ten thousands + 4 hundreds = 6,060,400

MATHEMATICS
4 - 6

AREA: NUMERATION - READING, ORDERING, COMPARING NUMBERS

OUTCOMES: 23. Complete a number sentence by providing the missing symbol(s).
24. Use numbers and symbols to write mathematical expressions describing realistic situations.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know addition, subtraction, and multiplication facts.
2. Compare numbers.
3. Understand the meaning of symbols >, <, = .

Steps to Success

1. The purpose of the following activities is to extend the use of the symbols >, <, and = from simple comparison of numbers to problem solving situations.

ACTIVITY 1 - OUTCOME 23

Review comparison of numbers using the symbols >, <, and = by having students decide which symbol makes the sentence true.

Example: Write >, <, or =.

32 _____ 48　　　　329 _____ 398

Introduce students to sentences that require computation before a comparison can be made.

Example: 62 + 15 _____ 72
62 + 15 _____ 77

ACTIVITY 1 - OUTCOME 23 (Cont'd)

Ask students, "What must we do before we can compare?"

Students should discover that to compare they must find the sum of the two numbers on the left. Then compare their answer to the number on the right.

This activity may be extended to subtraction, multiplication, or division.

Write either >, <, or = to make each number sentence correct.

Example: 16 + 84 _____ 96 + 12
95 - 26 _____ 87 - 19
3240 - 36 _____ 2240 + 336

Have students verbally describe what they must do before they can compare. Calculations should then be completed to decide on the correct symbol to use.

ACTIVITY 2 - OUTCOME 24

Give simple word problems which require students to write a comparison sentence using >, <, or =.

Example:

John has 28 red marbles and 32 blue marbles.
Margie has 15 red marbles and 43 blue marbles.
Who has more marbles, John or Margie?

Ask students to first verbalize what they must do. Next, have them write the problem in sentence form. Then compute to compare.

Example:

John		Margie
28 + 32	>	15 + 43
60 marbles		58 marbles

MATHEMATICS
4 - 6

AREA: OPERATIONS WITH WHOLE NUMBERS

OUTCOME: 1. Demonstrate a knowledge of basic addition, subtraction, division, and multiplication facts by solving problems on a timed test.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know how to add, subtract, multiply, and divide.

Steps for Success

1. When taking timed tests, students may be anxious. To relieve some of this anxiety, some tests might be given without recording grades.

ACTIVITY 1 - OUTCOME 1

Give timed tests only after students are comfortable with the testing operation. The amount of time should be reasonable for the number of problems tested.

Example: 10 addition problems
30 seconds

ACTIVITY 1 - OUTCOME 1 (Cont´d)

Keep timed tests short, preferably 60 seconds or less. Let students grade their own papers and record their own progress over a period of time.

Example: 25 multiplication problems
60 seconds

Name Jim

Number of Tests	1	2	3	4	5	
Number correct	20	18	23	23	25	

AREA: OPERATIONS WITH WHOLE NUMBERS

OUTCOMES: 2. Add and subtract whole numbers.
10. Recognize and locate calculation errors in computation problems.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know the basic facts for each operation.
2. Have knowledge of the process they will be checking. For example, students must know how to multiply using 2-digit multipliers in order to check that type of problem.

Steps to Success

1. Incorrectly worked problems from students' papers must be gathered ahead of time.
2. Students should not know whose paper they corrected.
3. There are many types of computation errors. It is not necessary that students be able to classify them, but they should be able to recognize common errors.

ACTIVITY 1 - OUTCOME 10

Refer to Basic Skills Instructional Materials - Grade 6, Competency IV - 3 for ideas concerning errors in computation problems.

ACTIVITY 1 - OUTCOMES 2 and 10 (Cont´d)

Select incorrectly worked computation problems from students papers to use for this lesson. Show students how to look for errors by working the problems themselves and by going over the problems step by step to determine where and what kind of errors have been made.

Further practice can be given by composing a worksheet by using problems the students have worked incorrectly on their papers.

MATHEMATICS
4 - 6

AREA: OPERATIONS WITH WHOLE NUMBERS

OUTCOMES:
3. Multiply and divide whole numbers.
4. Name the missing factor in a multiplication sentence.
5. Multiply by multiples of 10, 100, and 1000.
6. Use commutative property of addition and multiplication to check answers to problems.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know multiplication and division facts.
2. Understand place value in whole numbers.
3. Understand the meaning of factor, product, divisor, dividend, and quotient.
4. Know that multiplication and division are inverse operations.
5. Round numbers to the nearest 10 or 100.

Steps to Success

1. Until students have mastered the placement of digits in multiplication, they should continue to use 0´s to hold the 10´s and 100´s place.

ACTIVITY 1 - OUTCOMES 4 and 5

Discuss with students the patterns of multiplying by multiples of 10, 100, and 1000 by solving several problems.

Example:

$$\begin{array}{r} 5 \\ \times\ 10 \\ \hline \underline{50} \end{array} \qquad \begin{array}{r} 5 \\ \times\ 100 \\ \hline \underline{500} \end{array} \qquad \begin{array}{r} 5 \\ \times\ 1000 \\ \hline \underline{5000} \end{array}$$

ACTIVITY 1 - OUTCOMES 4 and 5 (Cont´d)

Students should be lead to discover the following:

1. Multiplying by tens--one 0 ends the product.
2. Multiplying by hundreds--two 0´s end the product.
3. Multiplying by thousands--three 0´s end the product.

Continue by having students complete simple multiplication sentences that involve multiples of 10, 100, and 1000.

Example: 20 x 3 = 2 x 40 =
200 x 3 = 2 x 400 =
2000 x 3 = 2 x 4000 =

Students should relate these patterns by writing the correct number of zeros in the product and by multiplying by the one-digit multiplier.

ACTIVITY 2 - OUTCOME 3

To begin division by a two-digit divisor, help students locate where the first digit in the quotient should be placed.

Example:

$29\overline{)245}$

$29\overline{)2}$ 29 will not divide into 2.

$29\overline{)24}$ 29 will not divide into 24.

$\begin{array}{r} x \\ 29\overline{)245} \end{array}$ 29 will divide into 245, so our quotient will go over the digit 5 in the number 245.

ACTIVITY 2 - OUTCOME 3 (Cont´d)

In the beginning, one-stage problems have one digit in the quotient, but it is advisable to make students aware of the placement of the digits in the quotient at all times.

Help students understand that estimation must be used in division. Sometimes estimates may be incorrect and will need to be changed.

To make numbers easier to work with, round them to the nearest ten. Have students round the divisor to the nearest ten and explain that this number is used only to get an estimated answer.

Example: 29 rounds to 30.

$$29\overline{)245}$$

To estimate use 30 as a divisor. $30\overline{)245}$ The estimated quotient would be 8.

The next step is to multiply the estimated quotient times the actual divisor to see if it is correct.

Example:

$$\begin{array}{r} 8 \\ 29\overline{)245} \\ \underline{-232} \\ 13 \end{array}$$

Many times, the first estimate is too large or too small. Stress the following checks for deciding if the quotient is too large or too small.

Example: The estimated quotient is too large.

$$\begin{array}{rl} 6 & \text{<--- too large} \\ 54\overline{)316} & \\ \underline{-324} & \text{<--- cannot subtract} \end{array}$$

324 cannot be subtracted from 316, therefore the estimated quotient is too large.

ACTIVITY 2 - OUTCOME 3 (Cont'd)

Example: The estimated quotient is too small.

```
    4  <--- too small
78)393
  -312
    81  <--- remainder larger than divisor
```

The remainder (81) is larger than the divisor (78). In this case, the quotient is too small.

ACTIVITY 3 - OUTCOMES 3 and 4

It is very important for students to place the first digit of the quotient in the correct place.

Give students practice finding the correct place by placing an x for the first digit in the quotient.

```
Example:     x            x
         78)895     85)70256
```

Have students decide how many digits will be in the quotient by placing an x over each digit after the first one.

```
Example:    xx             xxx
         78)895     85)70256
```

In two and three stage division, add a "bring down" step to the steps previously used.

ACTIVITY 3 - OUTCOMES 3 and 4 (Cont'd)

Example:

$$\begin{array}{r} 11 \\ 78\overline{)895} \\ \underline{-78}\downarrow \\ 115 \\ \underline{-78} \\ R37 \end{array} \qquad \begin{array}{r} 826 \\ 85\overline{)70256} \\ \underline{-680}\downarrow\; \\ 225\; \\ \underline{-170}\downarrow \\ 556 \\ \underline{-510} \\ R46 \end{array}$$

Make sure students bring down only one digit at a time.

Discuss with students the steps for division and what should be done before going to the next step.

Four Steps to Division

1. Divide--make sure the first digit of quotient is placed correctly.
2. Multiply--check to see if you can subtract. (Was your estimate too large?)
3. Subtract--check to see if your remainder is too large. (Was your estimate too small?)
4. Bring Down--bring down only one digit at a time.

Repeat the four steps until all digits in the dividend have been brought down.

ACTIVITY 4 - OUTCOME 4

Present students with several multiplication sentences that each have one factor missing. Have them write a division sentence that helps them find the missing factor.

Example: $100 \times \underline{\quad} = 500$
$500 \div 100 = \underline{5}$

Some students may benefit from using words to express number sentences.

Example: Factor x Factor = Product
Product ÷ Factor = Factor

412

413

ACTIVITY 5 - OUTCOMES 3 and 6

When introducing multiplication by two digit numbers, a discussion about the distributive property of multiplication should help students discover that they are actually multiplying by a number of ones and a number of tens. This can be shown several ways.

Example:

a. $46 \times 32 = (46 \times 2) + (46 \times 30)$

$\qquad\qquad 92 \quad + \quad 1380 = 1472$

b. $$\begin{array}{r} 46 \\ \underline{\times\ 32} \end{array} = \begin{array}{r} 46 \\ \underline{\times\ 2} \\ 92 \end{array} + \begin{array}{r} 46 \\ \underline{\times\ 30} \\ 1380 \end{array} = 1472$$

Continue by having students work problems following the pattern below:

Multiply by 2	Multiply by 30	Add (the partial products)
$\begin{array}{r} 46 \\ \underline{\times\ \ 2} \\ 92 \end{array}$	$\begin{array}{r} 46 \\ \underline{\times\ 30} \\ 90 \\ \underline{880} \end{array}$	$\begin{array}{r} 46 \\ \underline{\times\ 32} \\ 92 \\ \underline{+\ 880} \\ 972 \end{array}$

Present students with examples involving multiplication of a two-digit factor by a factor with three or four digits. After completing several examples, students should find that when multiplying by a two-digit number, there will be two partial products regardless of the number of digits in the multiplicand.

Steps to Multiplying by a Two-digit Number

1. Multiply by the ones.
2. Multiply by the tens.
3. Add the two partial products.

Extension: This procedure can be used for multiplication by a three-digit number by adding a step for multiplying by hundreds.

ACTIVITY 6 - OUTCOME 6

The commutative property of multiplication can be used to check multiplication problems.

Review one-digit factors with students.

Example: $2 \times 4 = 8$
$4 \times 2 = 8$

The order of the factors does not change the product; use examples with two and three digits.

Example:

$$\begin{array}{r} 28 \\ \underline{\times\ 32} \\ 56 \\ \underline{840} \\ 896 \end{array} \longleftarrow\!\!\!-\!\!-\!\!-\!\!-\!\!\longrightarrow \begin{array}{r} 32 \\ \underline{\times\ 28} \\ 256 \\ \underline{640} \\ 896 \end{array}$$

This procedure should be used to check multiplication problems to ensure accuracy.

AREA: OPERATIONS WITH WHOLE NUMBERS

OUTCOMES: 6. Use commutative property of addition and multiplication to check answers to problems.
7. Use associative property of addition and multiplication to check problems with three or more addends and/or three or more factors.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know basic addition and subtraction facts.
2. Understand place value.
3. Demonstrate a knowledge of regrouping.

Steps to Success

1. Most students have mastered the process of addition and subtraction. Carelessness is often the cause of many wrong answers. Checking answers can help find careless mistakes.

ACTIVITY 1 - OUTCOMES 6 and 7

Using the commutative property of addition, have students list the numbers in a different order and add to check.

Example:

$$\begin{array}{r} 238 \\ 435 \\ +\ 697 \\ \hline 1370 \end{array} \qquad \begin{array}{r} 697 \\ 435 \\ +\ 238 \\ \hline 1370 \end{array}$$

Encouraging students to show the numbers carried or regrouped helps them to calculate correct answers.

Using the associative property of addition, have students regroup column answers according to their place value and add to check.

ACTIVITY 1 - OUTCOMES 6 and 7 (Cont'd)

Have students write the sum of each column as shown below. The sum of the subtotals should be the same as the original sum.

Example:	248	24	sum of ones column
	669	180	sum of tens column
	+ 487	1200	sum of hundreds column
	1404	1404	

ACTIVITY 2 - OUTCOMES 6 and 7

The most common check for subtraction is to add the difference to the subtrahend.

			check	
Example:	306	minuend	38	difference
	- 268	subtrahend	+ 268	subtrahend
	38	difference	306	minuend

Another method of checking subtraction is to subtract the difference from the minuend as below.

			check	
Example:	306	minuend	306	minuend
	- 268	subtrahend	- 38	difference
	38	difference	268	subtrahend

MATHEMATICS
4 - 6

AREA: OPERATIONS WITH WHOLE NUMBERS

OUTCOMES: 8. Round numbers to estimate sums, differences, products, and quotients.
9. Select the most reasonable answers to addition, subtraction, division, and/or multiplication problems.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Round to the nearest ten, hundred, thousand, etc.

Steps to Success

1. An estimate is not an exact answer. Estimating is done to quickly find an approximate answer. An estimated answer can also be used to decide if an answer makes sense.

ACTIVITY 1 - OUTCOME 8

To review rounding of numbers refer to AREA: NUMERATION, OUTCOME 18.

Introduce students to estimating answers by first rounding the addends or factors of problems.

Example:

$$\begin{array}{rcr} 48 & = & 50 \\ \underline{-\ 23} & = & \underline{-\ 20} \\ \text{estimated difference} & = & 30 \end{array} \qquad \begin{array}{rcr} 63 & = & 60 \\ \underline{\times\ 24} & = & \underline{\times\ 20} \\ \text{estimated product} & = & 1200 \end{array}$$

$$\begin{array}{rcr} 248 & = & 200 \\ \underline{362} & = & \underline{+\ 400} \\ \text{estimated sum} & = & 600 \end{array} \qquad \begin{array}{rcr} & = & \\ 27\overline{)2734} & = & 30\overline{)3000} \\ \text{estimated quotient} & = & 100 \end{array}$$

After estimating solutions to problems, ask students to work the actual problems to discover if the estimated answers are near the exact answers.

ACTIVITY 1 - OUTCOME 8 (Cont'd)

Extension: Introduce students to everyday situations where they might use estimates. Students can write their own problems and have other students estimate the answers.

ACTIVITY 2 - OUTCOME 9

Present students with several problems that have four or more answer choices. Have students estimate to decide which answer is most reasonable.

Choose the closest answer.

Example: 735 + 658 =
a. 1400 <--- closest answer
b. 1450
c. 1500
d. 1550

Help students learn that they must round 735 to 750 and 658 to 660 to find the closest answer.

After students understand that estimation can be used to decide if their answer is reasonable, present problems with answer choices which include the actual answer. Have students estimate to decide which answer is correct.

Choose the correct answer.

Example:

$$\begin{array}{r} 735 \\ \underline{\times\ 38} \end{array}$$

a. 25,930
b. 2,793
c. 27,930
d. 38,930

Estimate

$$\begin{array}{rcr} 735 & = & 700 \\ \underline{\times\ 38} & = & \underline{\times\ 40} \\ & & 28{,}000 \end{array}$$

The answer choice should be (c) 27,930.

AREA: OPERATIONS WITH WHOLE NUMBERS

OUTCOME: 11. Find averages.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Add and divide whole numbers

Steps to Success

1. If available, refer to Basic Skills Instructional Material, Grade Six, pp. 190-191.
2. An average provides general information about a collection of data.
3. A very high or low number can change the average.

ACTIVITY 1 - OUTCOME 11

Refer to the Basic Skills Instructional Material, Grade Six (pp. 190-191).

ACTIVITY 2 - OUTCOME 11

An average is the sum of a group of numbers divided by the number of addends.

Example: Find the average of 55, 30, 80, 60, and 75.

ACTIVITY 2 - OUTCOME 11 (Cont´d)

Step 1:

$$\begin{array}{r} \left.\begin{array}{r} 55 \\ 30 \\ 80 \\ 60 \\ \underline{75} \end{array}\right\} \text{5 numbers used} \\ 300 \phantom{\text{5 numbers used}} \end{array}$$

Step 2:

$$\begin{array}{r} 60 \\ 5\overline{)300} \\ \underline{30} \\ 0 \\ 0 \end{array}$$

MATHEMATICS
4 - 6

AREA: OPERATIONS WITH WHOLE NUMBERS

OUTCOMES: **12. Write an addition sentence using a given subtraction sentence and vice versa.**
13. Write a division sentence using a given multiplication sentence and vice versa.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know basic multiplication and division facts.

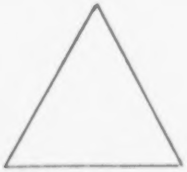
Steps to Success

1. This activity may be used with addition and subtraction, as well as with multiplication and division.

ACTIVITY 1 - OUTCOMES 12 and 13

Make several cardboard triangles.

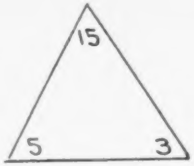
Example:



ACTIVITY 1 - OUTCOMES 12 and 13 (Cont´d)

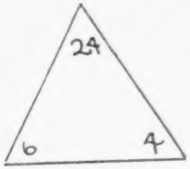
In each corner of the triangle place a number used in a basic multiplication fact.

Example: 5 x 3 = 15



Give a student a triangle and ask him/her to write a multiplication sentence and a division sentence using the three numbers on the triangle.

Example:



6 x 4 = 24
24 ÷ 4 = 6

Variation: Use this activity with addition and subtraction facts.

AREA: OPERATIONS WITH WHOLE NUMBERS

OUTCOMES:
12. **Write an addition sentence using a given subtraction sentence and vice versa.**
14. **Solve simple horizontal equations.**

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know basic computational facts.

Steps to Success

1. A review of the definition of the "equal to" (=) sign might be appropriate at this time.

ACTIVITY 1 - OUTCOMES 12 and 14

Many times a symbol is used to represent a missing number in a number sentence. Write several sample equations on the chalkboard.

Example: 3 + 4 = ___   5 - 2 = ___
3 + 4 = 7   5 - 2 = 3

Continue by explaining that a missing number may be represented by using a letter.

Example: 3 + n = 7

ACTIVITY 1 - OUTCOMES 12 and 14 (Cont'd)

Students should solve for n.

$3 + n = 7$
$n = 4$

Filling in a chart like the one below will help students relate using equations to actual problems.

Cans of Beans in Stock	No. of Cans Sold	No. of Cans left
15	7	8
10	n	6
n	7	28

Have students write the equation for each missing number and solve for n.

MATHEMATICS
4 - 6

AREA: OPERATIONS WITH WHOLE NUMBERS

OUTCOMES:
1. Demonstrate a knowledge of basic addition, subtraction, division, and multiplication facts by solving problems on a timed test.
2. Add and subtract whole numbers.
3. Multiply and divide whole numbers.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know how to load, boot, and operate a computer assisted instructional package.

Steps to Success

1. The teacher should have basic computer skills or access to someone who does.
2. The teacher must have access to at least four computers and appropriate computer software.
3. The following activity can be used in grades 4-6 for review and practice of the basic math facts in addition, subtraction, multiplication and division. The teacher must select the software appropriate to the grade level and the math concept being reviewed.

For example:

MECC disk # 125 ADDITION LOGITION
MECC disk # 146 SUBTRACTION PUZZLES
MECC disk # 147 MULTIPLICATION PUZZLES
MECC disk # 148 QUOTIENT QUEST
MECC disk # 162 PATH TACTICS
MECC disk # 169 SPEEDWAY MATH
MECC disk # 702 ELEMENTARY VOL 2 (SPEED DRILL)
MECC disk # 705 ELEMENTARY VOL 4 (MATH GAME)

Steps to Success (Cont´d)

The last four disks contain programs that cover all four areas of basic math facts. DO NOT USE ANY SOFTWARE UNLESS YOU HAVE REVIEWED IT! Make sure that the software fits the needs of your students, and pay attention to the time it takes to finish the assignment.

4. It is very important that students are given all the "rules" for using the computers. Spend time letting them get use to the equipment before attempting any CAI activity. This will not take long. After 30 minutes of "discovery" time on the keyboard, most students feel comfortable.
5. If students are not accustomed to group work, it will take a few sessions such as this to get the "bugs" worked out. Students tend to depend a great deal on the teacher, but encourage them to be more independent and responsible for their own work. Don´t give up if things are hectic the first time.
6. Do not expect this to be a quiet activity. It will not be. Maintain order, but remember this is an ACTIVE-ity.
7. The teacher´s role should be one of helper/facilitator. With more than three groups, this role is difficult to manage. If there are aides or parent volunteers available, use them.

ACTIVITY 1 - OUTCOMES 1, 2, and 3

Use a computer and a math worksheet generator software package to generate a math worksheet. (If MECC materials are available, use MECC disk # 151 - MASTERING MATH WORKSHEET GENERATOR.) The worksheet should complement the activities and concepts covered by the software package. For example, the MECC MATH WORKSHEET GENERATOR is pre-programmed to generate worksheets that complement ADDITION, LOGITION, SUBTRACTION PUZZLES, MULTIPLICATION PUZZLES and QUOTIENT QUEST. It can also generate customized worksheets. Keep in mind that the worksheets should require the same amount of time to complete as the software assignment. You may want to generate more than one worksheet. Two short worksheets might be better than one long one for maintaining interest.

Divide students into groups. The number of students in each group should be equal to or less than the number of computers available. Assign the computer activity to one group and the worksheet to another group. (If you are using MATH GAME or SPEED DRILL on the ELEMENTARY series disks, students can be paired on the computers because of the game formats.) If there are more than two groups, select additional activities from this section or design additional activities so that each group has a different activity. The activities should require minimal teacher involvement, address the same objectives, and match the time requirement of the software, so choose carefully.

435

436

ACTIVITY 1 - OUTCOMES 1, 2, and 3 (Cont´d)

Set a time limit that is appropriate for the particular computer software selected, and tell the students that they must rotate groups at the end of the time limit. The time limit might be 15 minutes or 30 minutes, depending on the age of the students and the activity selected.

The MECC MANAGEMENT SYSTEM (disk # 150) can be used with ADDITION LOGITION, SUBTRACTION PUZZLES and QUOTIENT QUEST to keep a record of student progress. These programs are a part of the MECC MASTERING MATH series. Refer to the manual or disk # 150 for information on how to use the management and diagnostic systems in this series. The students´ disks can be used with or without these teacher utilities.

MATHEMATICS
4 - 6

AREA: FRACTIONS

OUTCOMES:
1. Name the designated part of a region or set as a common fraction.
2. Name the relationship between the lengths of two line segments as a common fraction.

NOTES FOR THE TEACHER

1. Refer to K-3 Fractions, outcomes 1, 2, and 3.

439

440

MATHEMATICS
4 - 6

AREA: FRACTIONS

OUTCOMES: **3. Rename mixed numbers as improper fractions and vice versa.**
4. Identify a fraction as a proper or improper fraction.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Add, multiply, and divide whole numbers.
2. Distinguish between numerator and denominator.

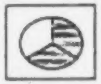
Steps to Success

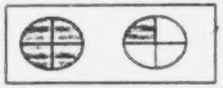
1. Students should have some experience with writing remainders as fractions.
2. When changing mixed numbers to improper fractions and vice versa, it is not necessary to write out the computation if the students can do it in their heads.

ACTIVITY 1 - OUTCOME 4

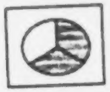
Draw the following pictures on the board.

Example:

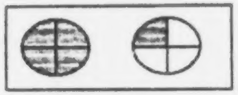




Have the students write a fraction for each picture.



$= \frac{2}{3}$ Numerator
Denominator



$= \frac{5}{4}$ Numerator
Denominator

441

442

ACTIVITY 1 - OUTCOME 4 (Cont´d)

The fraction 2/3 is called a proper fraction. A proper fraction is one in which the numerator is smaller than the denominator. Write the following on the board and have the students circle the proper fractions.

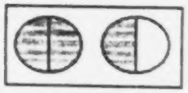
Example: [✓ $\frac{1}{3}$] [✓ $\frac{3}{4}$] $\frac{6}{5}$ [✓ $\frac{1}{4}$]

Have the students look at the second drawing and the fraction 5/4. Tell the students that 5/4 is called an improper fraction. An improper fraction is one in which the numerator is equal to or greater than the denominator. An improper fraction is equal to or greater than 1.

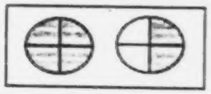
Example: 5/4 = 1 whole and 1/4 of another

Write the following improper fractions on the board. Ask students to draw pictures to represent the improper fractions. This should reinforce the idea that an improper fraction is equal to or greater than 1.

3/2



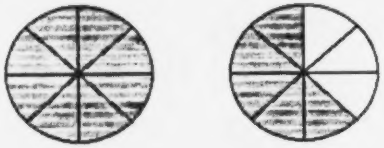
6/4



ACTIVITY 2 - OUTCOME 3

Use the following example to show the students that both improper fractions and mixed numbers can be used to name the same fractional number.

ACTIVITY 2 - OUTCOME 3 (Cont'd)

MIXED NUMBER	PICTURE	IMPROPER FRACTION
Number of pieces in the part of a whole. ↓ Wholes→1 5/8 ↑ Number of equal pieces in one whole.		Total number of equal pieces. ↓ 13/8 ↑ Number of equal pieces in one whole.

$$\boxed{1\ 5/8 = 13/8}$$

Write 1 5/8 on the board.

To change 1 5/8 to an improper fraction, follow this equation:

$$\frac{(\text{Denominator x whole number}) + \text{Numerator}}{\text{Denominator}}$$

Example: $1\frac{5}{8} = \frac{(8 \times 1) + 5}{8} = \frac{13}{8}$

Write 13/8 on the board.

ACTIVITY 2 - OUTCOME 3 (Cont´d)

To change 13/8 to a mixed number, divide the numerator by the denominator to obtain the whole number. If there is a remainder, write the remainder over the denominator.

Example: 13/8

$$\begin{array}{r} 1\ 5/8 \\ 8\overline{)13} \\ \underline{-8} \\ 5 \text{ Remainder} \end{array}$$

13/8 = 1 5/8

MATHEMATICS
4 - 6

AREA: FRACTIONS

OUTCOME: 5. Reduce fractions to simplest terms.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Multiply and divide whole numbers.
2. Understand the term factor and be able to write the factors of given numbers.
3. Distinguish between a numerator and a denominator.
4. Find multiples of a number.

Steps for Success

1. Students must feel comfortable with multiplication and division of whole numbers.
2. Using the Greatest Common Factor (GCF) method is more efficient than trial and error and will reduce the amount of time needed for solving problems.

ACTIVITY 1 - OUTCOME 5

A fraction is in simplest form when there is no number other than 1 which divides its numerator and denominator evenly.

Example: 1/2, 3/4, 5/9 are in simplest form because there is no number other than 1 which divides the numerator and denominator evenly.

ACTIVITY 1 - OUTCOME 5 (Cont´d)

To write a fraction in simplest form, divide its numerator and denominator by the greatest possible number, which is their greatest common factor (GCF).

Write the fraction 6/12 on the board. Have the students write the factors for 6 and 12, then circle the Greatest Common factor (GCF).

Example: 6 = (1, 2, 3, ⑥) Factors
12 = (1, 2, 3, 4, ⑥, 12) Factors

Divide the numerator and denominator by the GCF.

Example: $\frac{6 \div 6 \text{ (GCF)}}{12 \div 6 \text{ (GCF)}} = \frac{1}{2}$

$\frac{6}{12}$ in simplest form is $\frac{1}{2}$.

MATHEMATICS
4 - 6

AREA: FRACTIONS

OUTCOMES:
10. Add and subtract fractions, mixed numbers, and/or whole numbers.
11. Solve word problems involving the addition and/or subtraction of fractions.
12. Multiply and divide fractions, mixed numbers, and/or whole numbers.
15. Solve word problems involving fractions.

NOTES FOR THE TEACHER

Prerequisites for Students

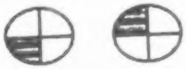
1. Distinguish between a numerator and a denominator.
2. Use the LCM method to find the LCD.
3. Find equivalent fractions.
4. Simplify fractions and mixed numbers.
5. Distinguish between a proper fraction, an improper fraction and a mixed number.
6. Change improper fractions to mixed numbers and change mixed numbers to improper fractions.
7. Add/subtract fractions with like denominators.

Steps for Success

1. Students should have had practice with finding the LCD and making equivalent fractions.
2. Students must be able to simplify fractions with little difficulty.
3. Students will need to practice each outcome thoroughly before moving to the next outcome.
4. Activities should be done in the order given.

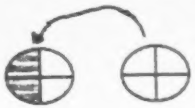
ACTIVITY 1 - OUTCOMES 10 and 11

Draw the following pies on the board.



ACTIVITY 1 - OUTCOMES 10 and 11 (Cont´d)

Both pies had four pieces; now each pie has 1 piece left or 1/4th the original pie. To save space, we need to combine the two pies onto one plate.



By adding 1/4 of a pie to 1/4 of another pie, we now have 2/4 or 1/2 of one pie or 1/4 + 1/4 = 2/4.

When adding fractions with like denominators, add the numerators and use the common denominator.

Example: 5/10 + 3/10 = 8/10

1/5 + 2/5 = 3/5

Note: This activity can be used to show subtraction of fractions with like denominators.

By presenting problems in story fashion, students become ready to solve word problems.

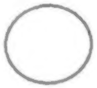
A simple word problem might be:

2/5 of a pie and 1/5 of a pie makes how much?

ACTIVITY 2 - OUTCOME 10

Draw a large circle on the board.

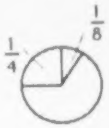
Example:



ACTIVITY 2 - OUTCOME 10 (Cont'd)

Tell the students that they have been given 1/4 of one pizza and 1/8 of another pizza. Place the fractional parts on the circle.

Example:



What should the students do in order to find out how many parts there are all together? The students should respond that it is necessary to add the two parts together.

Write on the board 1/4 + 1/8 =

Tell the students to look at the problem. If the denominators are not alike, it is necessary to rename the fractions so that they both have the same denominator before adding or subtracting. Find the least common multiple of the denominators.

1/4 + 1/8 = $\boxed{\text{8 is the LCM}}$

4, ⑧, 12...   ⑧, 16, 24...

Use the least common multiple for the common denominator.

$$\begin{array}{rcr} 1/4 & = & /8 \\ +\ 1/8 & = & +\ /8 \\ \hline \end{array}$$

Using the LCD, rename the fractions.

$$\begin{array}{rcr} 1/4 & = & 2/8 \\ +\ 1/8 & = & +\ 1/8 \\ \hline \end{array}$$

Add.

$$\begin{array}{rcr} 1/4 & = & 2/8 \\ +\ 1/8 & = & +\ 1/8 \\ \hline & & 3/8 \end{array}$$

Simplify the answer if necessary. The same procedure is used when subtracting fractions.

ACTIVITY 3 - OUTCOME 10

Write the problem 3 1/5 + 2 3/5 on the board.

Example:

$$\begin{array}{r} 3\ 1/5 \\ \underline{+\ 2\ 3/5} \end{array}$$

When adding mixed numbers with like denominators, add the fractions first.

Example:

$$\begin{array}{r} 3\ 1/5 \\ \underline{+\ 2\ 3/5} \\ 4/5 \end{array}$$

Add the whole numbers.

$$\begin{array}{r} 3\ 1/5 \\ \underline{+\ 2\ 3/5} \\ 5\ 4/5 \end{array}$$

Simplify the answer if necessary.

Note: This same process can be used when subtracting mixed numbers with like denominators.

ACTIVITY 4 - OUTCOME 10

When adding mixed numbers with unlike denominators, students need to remember what they already know about adding fractions with unlike denominators.

Write the problem on the board.

Example:

$$\begin{array}{r} 6\ 1/3 \\ \underline{+\ 5\ 1/2} \end{array}$$

Have the students rename 1/3 and 1/2 by using the LCM method for finding the LCD.

Example: Find the LCD   Rename the Fractions

$$\begin{array}{r} 6\ 1/3 = 6\ \ \ /6 \\ \underline{+\ 5\ 1/2 = 5\ \ \ /6} \end{array} \qquad\qquad \begin{array}{r} 6\ 1/3 = 6\ 2/6 \\ \underline{+\ 5\ 1/2 = 5\ 3/6} \end{array}$$

ACTIVITY 4 - OUTCOME 10 (Cont'd)

The students should add the fractional parts, and then add the whole numbers.

Example: Add the fractional parts. Add the whole numbers.

$$\begin{array}{rcl} 6\ 1/3 & = & 2/6 \\ +\ 5\ 1/2 & = & 3/6 \\ \hline & & 5/6 \end{array} \qquad \begin{array}{rcl} 6\ 1/3 & = & 2/6 \\ +\ 5\ 1/2 & = & 3/6 \\ \hline 11 & & 5/6 \end{array}$$

The answer is 11 5/6.

Simplify the fraction if necessary.

Note: This same process can be used when subtracting mixed numbers with like fractions.

ACTIVITY 5 - OUTCOME 12

Write the problem 1/2 x 1/3 on the board.

When multiplying fractions, multiply the numerators together and multiply the denominators together.

$$1/2 \times 1/3 = \frac{1 \times 1}{2 \times 3} = 1/6$$

Simplify the answer if necessary.

Example: 6/10 x 5/8

ACTIVITY 5 - OUTCOME 12 (Cont´d)

Write the problem 6/10 x 5/8 on the board.

The students should multiply the fractions.

$6/10 \times 5/8 = \frac{6 \times 5}{10 \times 8} = 30/80$

Can this fraction be simplified? Students should simplify the fraction 30/80 to 3/8.

There is a short cut for multiplying fractions that are large. Stress that by using the short cut, students will cut down on the amount of simplifying needed to be done at the end of the problem.

Use the fractions 6/10 x 5/8 again.

Explain that in the first step you should look at the numerators and denominators that are opposite of each other.

Example: $\frac{6}{10} \times \frac{5}{8}$ Look at 6 and 8, 5 and 10.

Looking at the numerator 6 and the denominator 8, ask: What is the largest number that will divide into 6 and 8 evenly?

Example: $\frac{6}{10} \times \frac{5}{8}$ 2 is the largest number.

Divide 6 and 8 by 2. Cross out the numbers 6 and 8 and write in the answers you get after dividing.

$\frac{\overset{3}{\cancel{6}}}{10} \times \frac{5}{\underset{4}{\cancel{8}}}$

2 into 6 = 3
2 into 8 = 4

ACTIVITY 5 - OUTCOME 12 (Cont'd)

Follow the same steps for the numerator 5 and the denominator 10.

$$\begin{array}{ccc} \overset{3}{\cancel{6}} & \times & \text{⑤} \\ \hline \text{⑩} & \times & \underset{4}{\cancel{8}} \end{array}$$

5 is the largest number that will divide into 5 and 10 evenly.

$$\frac{6}{10} \times \frac{5}{8} \qquad \frac{\overset{3}{\cancel{6}}}{\underset{2}{\cancel{10}}} \times \frac{\overset{1}{\cancel{5}}}{\underset{4}{\cancel{8}}}$$

5 into 5 = 1
5 into 10 = 2

The problem should look like the example. Rewrite the fractions and multiply the fractions as usual.

Example: $\frac{\overset{3}{\cancel{6}}}{\underset{2}{\cancel{10}}} \times \frac{\overset{1}{\cancel{5}}}{\underset{4}{\cancel{8}}} = \frac{3}{2} \times \frac{1}{4} = \frac{3}{8}$

Ask the students if 3/8 needs to be simplified. Point out that by using the short cut, the final answer was already simplified.

If the largest number is not used when dividing, the final answers may have to be simplified again.

ACTIVITY 6 - OUTCOME 12

Write 3 8/9 x 1 5/7 on the board.

Example: 3 8/9 x 1 5/7

Change the mixed numbers to improper fractions.

Examples: 3 8/9 x 1 5/7 = 35/9 x 12/7

Use the shortcut shown in ACTIVITY 5.

$$\frac{\overset{5}{\cancel{35}}}{\underset{3}{\cancel{9}}} \times \frac{\overset{4}{\cancel{12}}}{\underset{1}{\cancel{7}}}$$

ACTIVITY 6 - OUTCOME 12 (Cont´d)

Rewrite the fractions and multiply.

$$\frac{\overset{5}{\cancel{15}}}{\underset{3}{\cancel{9}}} \times \frac{\overset{4}{\cancel{12}}}{\underset{1}{\cancel{3}}} = \frac{5}{3} \times \frac{4}{1} = \frac{20}{3}$$

If the final answer is an improper fraction, it needs to be changed to a mixed number in order to be in simplest form.

$$\frac{20}{3} = 6\,\frac{2}{3}$$

ACTIVITY 7 - OUTCOME 12

Write the term "reciprocal" on the board. Explain that when two fractional numbers are multiplied and the product is 1, each number is called the reciprocal of the other.

Example: 3/4 is the reciprocal of 4/3.

3/4 x 4/3 = 12/12 = 1

Give the students several fractions. The students should find the reciprocal for each and also multiply each fraction by its reciprocal.

Example:	Fraction	Reciprocal	Multiply
	5/7	7/5	5/7 x 7/5 = 1

ACTIVITY 8 - OUTCOME 12

Students are now going to learn how to divide fractions. Review how to find the reciprocal of a fraction (ACTIVITY 7).

Write 9/10 ÷ 5/6 on the board.

When dividing fractions, multiply by the reciprocal of the divisor.

Example:

9/10 ÷ 5/6 = 9/10 x 6/5   The divisor is 5/6. The reciprocal is 6/5.

Multiply and simplify the final answer.

$$\frac{9}{10} \times \frac{6}{5} = \frac{54}{50} \quad \text{simplified to } 1\,\frac{2}{25}$$

1 2/25 is the quotient to our original division problem of 9/10 ÷ 5/6.

ACTIVITY 9 - OUTCOME 12

Write 2 ÷ 1/16 on the board.

Example: 2 ÷ 1/16

Rename the whole number in the problem as a fraction. This is done by simply placing the whole number over 1.

Example: 2 ÷ 1/16 = 2/1 ÷ 1/16

ACTIVITY 9 - OUTCOME 12 (Cont´d)

Rewrite the division problem as a multiplication problem using the reciprocal of the divisor.

Example: 2 ÷ 1/16 --> 2/1 ÷ 1/16 --> 2/1 x 16/1

Multiply and simplify.

Example: 2 ÷ 1/16 --> 2/1 ÷ 1/16 --> 2/1 x 16/1 = $\boxed{32/1 = 32}$

Dividing by a mixed number is similar to dividing with fractions. There is one additional step. Each mixed number should first be changed to an improper fraction. Divide as usual.

Rename as Fractions
Example: 2 2/5 ÷ 1 3/5 -->

Multiply by the Reciprocal
12/5 ÷ 8/5 = --> 12/5 x 5/8 = -->

Use the Multiplication Shortcut

$\frac{\overset{3}{\cancel{12}}}{\underset{1}{\cancel{5}}} \times \frac{\overset{1}{\cancel{5}}}{\underset{2}{\cancel{8}}} \longrightarrow$

Multiply

$\frac{\overset{3}{\cancel{12}}}{\underset{1}{\cancel{5}}} \times \frac{\overset{1}{\cancel{5}}}{\underset{2}{\cancel{8}}} = \frac{3}{2} \longrightarrow$

Rename as a Mixed Number

3/2 = 1 1/2

$\boxed{2\ 2/5 \div 1\ 3/5 = 1\ 1/2}$

ACTIVITY 10 - OUTCOME 15

After students have had practice computing fractions, they will be able to solve word problems involving fractions.

The following are sample word problems that may be used.

Addition:

Joe had 3/8 of a pizza and Jim had 2/4 of a pizza. How much pizza did Joe and Jim have together?

ACTIVITY 10 - OUTCOME 15 (Cont´d)

Subtraction:

Sue had 3 peanut butter sandwiches. She ate 1 and 3/4 sandwiches. How many sandwiches did she have left?

Multiplication:

Adam promised 10 friends they could each have 1/2 of his mother´s famous apple pies. How many pies did Adam´s mother have to bake to feed all of Adam´s 10 friends?

Division:

Carol had 3/4 of her birthday cake left from her birthday. She had invited 3 friends over for a piece of cake. If Carol cuts a piece for herself and her friends, how much cake will each person get?

AREA: FRACTIONS

OUTCOME: 13. Convert fractions to decimals.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Divide using decimals.
2. Understand that a decimal and a fraction are less than one.
3. Understand that a fraction is another way to write a division problem.

ACTIVITY 1 - OUTCOME 13

Write 3/4 on the board.

Example: 3/4

Rewrite 3/4 as a division problem dividing the denominator into the numerator.

Example: $4\overline{)\,3}$

Add a decimal and a zero in the dividend and write a decimal point in the quotient. Divide.

Example: $4\overline{)3.0}$

$$\begin{array}{r} .7 \\ 4\overline{)3.0} \\ \underline{2\,8} \\ 2 \end{array}$$

ACTIVITY 1 - OUTCOME 13 (Cont'd)

Add another zero in the dividend, bring it down, and divide. There is no remainder. 3/4 expressed as a decimal is .75.

```
             .75
Example:  4)3.00    3/4 = .75
            2 8
          4)  20
             -20
               0
```

Note: If there had been another remainder, another zero would have been repeated.

AREA: FRACTIONS

OUTCOME: 14. Estimate sums, differences, products, quotients of fractions.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Round fractions to whole numbers.
2. Know basic addition, subtraction, multiplication, and division facts.

Steps to Success

1. Round uncommon fractions (7/16, 9/20, 32/70, etc.) to the closest common fractions (1/2, 1/4, etc.).

ACTIVITY 1 - OUTCOME 14

To estimate the sum of two fractions, round each fraction to the nearest whole number or common fraction.

```
Example:  7/16        +     20/21 =
           ↓                  ↓
          round             round
          7/16 to 1/2       20/21 to 1
          ↓                 ↓
          1/2         +     1      = 1 1/2
```

Therefore, 7/16 + 20/21 = 1 1/2 (estimated)

ACTIVITY 1 - OUTCOME 14 (Cont´d)

When estimating mixed numbers, round each mixed number to the closest whole number.

Example: 6 6/8 + 3 9/10 =
↓ ↓
round round
6 6/8 to 7 3 9/10 to 4
↓ ↓
7 + 4 = 11

Therefore, 6 6/8 + 3 9/10 = 11 (estimated)

To estimate differences, products, or quotients, round the fractions to the nearest common fraction or whole number and perform the appropriate algorithm.

MATHEMATICS
4 - 6

AREA: DECIMALS

OUTCOME: 1. Identify the place value for a given digit in a decimal fraction or a mixed decimal through thousandths.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Understand that decimals are numbers less than one.
2. Understand that fractions can be written as decimals and vice versa.
3. Know whole number place values.

ACTIVITY 1 - OUTCOME 1

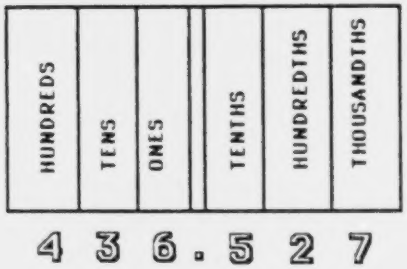
Our system for naming numerals is called a decimal system. Numbers are grouped by tens. The word decimal comes from a Latin word that refers to ten.

Going to the right, each place value is 1/10 of the place to its left.

HUNDREDS 100	TENS 1/10 of 100 = 10	ONES 1/10 of 10 = 1	TENTHS 1/10 of 1 = 1/10	HUNDREDTHS 1/10 of 1/10 = 1/100	THOUSANDTHS 1/10 of 1/100 = 1/1000

ACTIVITY 1 - OUTCOME 1 (Cont´d)

In our place value system, the first place to the right of the one´s place is called tenths. The second place to the right of the one´s place is called hundredths, and the third place is called thousandths. We use a decimal point to separate the one´s place and the tenth´s place.



Practice can be provided by giving students a number with a digit underlined and ask them to tell the place value of the underlined digit.

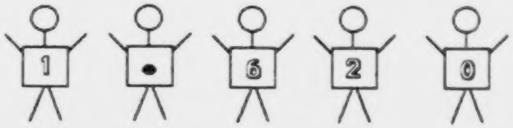
Example: 4.3   3 is in the tenth´s place.

ACTIVITY 2 - OUTCOME 1

Make 15 cards for each team. With a marker, write the numerals 0 through 9 on ten cards, write a 0 (zero) on 4 more cards. Place a decimal point on one card. Make a list of decimal fractions to be used.

This activity is called "Human Decimals." Divide the class into 2 teams of about 15 persons per team. Give each player on a team a card. The player holding the decimal point stands in front of his/her team. The teacher, or class leader, calls out a decimal fraction from the list. Team members (holding their cards) must arrange themselves in the proper order to represent the number called out by the teacher or class leader. The first team to do so correctly wins a point. Use both decimal fractions as well as mixed decimal numbers.

Example: 1.620



MATHEMATICS
4 - 6

AREA: DECIMALS

OUTCOMES: 2. Write the numeral for a given whole number and decimal fraction.
4. Find equivalent decimals and mixed numbers.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know decimal place value.
2. Understand the difference between decimals and whole numbers.

Steps to Success

1. This activity works well as a follow up to Activity 1, Outcome 1.

ACTIVITY 1 - OUTCOME 4

This activity is called Deci-maid and is played like the card game Old Maid. Make an "Old Maid" decimal numeral deck of cards. The cards are composed of 12 groups of 4 cards each, with a decimal numeral or fractional numeral that names the same number, and a "Deci-Maid" decimal number card.

Example:

3/4	.75	Seventy-five Hundredths	.750

The game is played according to the rules of Old Maid. The deck is shuffled and all cards are dealt to the players. In the beginning, all the players may put down each pair that names the same fractional numeral. Play begins by having the person to the left of the dealer draw one card from the dealers hand. If the player has a pair, he may lay the cards down. Play continues until one player is left holding the "Deci-maid " card.

ACTIVITY 1 - OUTCOME 4 (Cont´d)

Example:

ACTIVITY 2 - OUTCOME 2

Have students unscramble number words such as:

2 tens, 3 hundredths, 2 tenths, 6 hundreds, 0 ones = 620.23

MATHEMATICS
4 - 6

AREA: DECIMALS

OUTCOMES: 3. Compare and order decimals and/or mixed number.
5. Use comparative terms and symbols to compare decimals.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Understand place value as it relates to decimal numbers.
2. Know the meaning of greater than and less than signs (>, <)

Steps for Success

1. Give students practice with ordering and comparing whole numbers as well as decimal numbers.

ACTIVITY 1 - OUTCOMES 3 and 5

Refer to the Basic Skills Instructional Materials: Grade 6 (Competency I-2)

MATHEMATICS
4 - 6

AREA: DECIMALS

OUTCOME: 6. Convert a decimal to a fraction and vice versa.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know decimal place value.
2. Change fractions to lowest terms.

Steps to Success

1. Refer to Area: Fractions, Outcome 13 for converting fractions to decimals.
2. Refer to Basic Skills Instructional Material: Grade 6, pp. 187-189.
3. The place value name of a decimal number (.75 = seventy-five hundredths) will be the denominator and the decimal number will be the numerator $\frac{75}{100}$.
4. Refer to Fractions, Outcome 5 for changing fractions to lowest terms.

ACTIVITY 1 - OUTCOME 6

Point out to students that decimal numbers are written with the decimal number as the numerator over the value of the decimal written as the denominator.

Example 1: 0.61 The numerator will be 61 and the value of that decimal (hundredths) will be the denominator.
Thus: 0.61 = 61/100

ACTIVITY 1 - OUTCOME 6 (Cont'd)

Example 2: 0.7 The numerator will be 7 and the value of that decimal (tenths) will be the denominator.
Thus: 0.7 = 7/10

Example 3: 0.183 The numerator will be 183 and the value of that decimal (thousandths) will be the denominator.
Thus: 0.183 = 183/1000

Stress that not all decimal numbers when converted to fractions will be expressed in lowest terms.

Example 4: 0.8 = 8/10 which is not in lowest terms. 8/10 can be written as 4/5.
Thus: 0.8 can be written as a fraction in lowest terms of 4/5.

MATHEMATICS
4 - 6

AREA: DECIMALS

OUTCOMES:
7. **Add and subtract decimal numbers, mixed numbers, and/or whole numbers.**
8. **Multiply and divide decimal numbers, mixed numbers, and/or whole numbers.**
9. **Solve word problems involving decimals.**

NOTES FOR THE TEACHER

Prerequisites for Students

1. Add, subtract, multiply, and divide whole numbers.
2. Know place value of decimal numbers.

Steps to Success

1. Refer to Basic Skills Instructional Material: Grade 6, pp. 181-182.
2. Refer to Time, Measurement, Money, Outcomes 21, 22, 25.
3. The procedure for adding and subtracting decimals is the same as for whole numbers.
4. In addition and subtraction, align the decimal points and digits correctly in vertical form.
5. Multiply decimals as whole numbers but determine the placement of the decimal according to the value of the decimals.
6. The number of decimal places in the product equals the sum of the number of decimal places in the factors.
7. The procedure for division remains the same as with whole numbers.
8. Operations with decimal numbers are the same as with money numbers.
9. The procedure for solving word problems can be found in Applications.

ACTIVITY 1 - OUTCOME 7

The procedure for adding and subtracting decimals is the same as whole numbers. Write problems in vertical form and align the decimal points and perform the operation.

Example 1: 4.9 + 16.23 + 0.231

$$\begin{array}{r@{.}l} 4 & 9 \\ 16 & 23 \\ +\ 0 & 231 \\ \hline 21 & 361 \end{array}$$

Example 2: 14.68 - 3.8

$$\begin{array}{r@{.}l} 14 & 68 \\ -\ 3 & 8 \\ \hline 10 & 88 \end{array}$$

Stress to students that empty places can be filled with the place holder zero if it helps to keep the columns straight.

Example 3: 3.8 + 2.321

$$\begin{array}{r@{.}l} 3 & 800 \\ +\ 2 & 321 \\ \hline 6 & 121 \end{array}$$

ACTIVITY 2 - OUTCOME 8

The procedure for multiplying and dividing decimal numbers is the same as whole numbers. Stress the placement of the decimal as an important factor. Decimals will not be aligned as in adding and subtracting.

ACTIVITY 2 - OUTCOME 8 (Cont´d)

To help students determine the placement of the decimal, review how fractions are multiplied.

Example: $\frac{1}{10} \times \frac{1}{10} = \frac{1}{100}$

(tenths x tenths = hundredths)

Therefore, the answer should be marked off as hundredths.

Example 1: Multiply 14.2 x 1.8

$$\begin{array}{rll} 14.2 & \text{tenths} & \frac{1}{10} \\ \times\ \underline{1.8} & \times\ \underline{\text{tenths}} & \\ 1136 & & \frac{1}{10} \\ \underline{142} & & \times\ \underline{\frac{1}{10}} \\ 25.56 & \text{Hundredths} & \frac{1}{100} \end{array}$$

After this has been explained to students, the easier method can be explained.

Example 2:

$$\begin{array}{rl} 14.2 & \text{one place (1)} \\ \times\ \underline{1.8} & \text{one place (1)} \\ 1136 & \\ \underline{142} & \\ 25.56 & \text{two place (2)} \end{array}$$

Add the number of places to the right of the decimal in both numbers. Then, beginning at the right of the product, move the decimal that number of places.

ACTIVITY 3 - OUTCOME 8

Point out to students that the procedure for dividing a decimal number is the same as whole number, but the placement of the decimal will be an important step.

ACTIVITY 3 - OUTCOME 8 (Cont'd)

When dividing by a whole number, align the decimals.

Example 1: Divide 8.62 by 2

$$\begin{array}{r} 4.31\\ 2\overline{)8.62}\\ \underline{8}\\ 6\\ \underline{6}\\ 2\\ \underline{2} \end{array}$$

When dividing a decimal number by a decimal number, the decimal must be removed from the divisor. To remove a decimal from a divisor, both the divisor and dividend must be multiplied by the same multiple of 10.

The divisor is expressed in tenths, therefore, both the divisor and the dividend should be multiplied by 10.

The problem $1.5\overline{)\,9.75}$ would become $15\overline{)\,97.5}$ because 1.5 x 10 = 15 and 9.75 x 10 = 97.5.

After the explanation, discuss the easier method of determining the placement.

$$1\underset{\curvearrowright}{.5}\overline{)9\underset{\curvearrowright}{.7}5}$$

You need to move the decimal point one place to the right to make 1.5 to a number 15. What you do to the divisor, do the same to the dividend. Move the decimal point one place to the right and then align the decimal point in the answer.

Example:

$$\begin{array}{r} 6.5\\ 1\underset{\curvearrowright}{.5}\overline{)9\underset{\curvearrowright}{.7}.5}\\ \underline{9\ 0}\\ 7\ 5\\ \underline{7\ 5} \end{array}$$

AREA: DECIMALS

OUTCOMES: 10. Estimate the answer to problems involving decimals.
12. Round decimal numbers or mixed decimals.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Determine the place value of decimals.
2. Round whole numbers.
3. Estimate whole numbers and decimal numbers.

Steps to Success

1. Decimal numbers can be worked as whole numbers, but remember the decimal point.
2. Refer to rounding whole numbers in Numeration, Outcome 18.
3. Refer to Applications for problem solving.

ACTIVITY 1 - OUTCOME 12

To round a decimal number, you would use the same procedure used in rounding a whole number.

Example: Round 78.67 to the nearest tenth.

When rounding to the nearest tenth, the important place to check will be the hundredths column. In this case, 7 is the hundredths column. If the number is less than five, the tenths place will remain the same. If the number is greater than five, the tenths place will be increased by 1. Since 7 is greater than five, 78.67 will be rounded to 78.7.

In the procedure for rounding all decimal numbers, it is important to stress that the students have to consider the places of two numbers. These are: the place to be rounded to and the place to its right.

ACTIVITY 2 - OUTCOME 10

To estimate the answers to decimal problems, numbers must be rounded.

Example: Estimate the sum for 4.3 + 6.8.

Round 4.3 to the whole number 4 and 6.8 to the whole number 7. Add 4 + 7. The estimated answer would be 11.

This procedure will be used for estimating all decimals numbers for any computational problem.

Remember to round any mixed decimal number to the nearest whole number and perform the needed computation to reach an estimated solution.

AREA: DECIMALS

OUTCOME: 11. Find the average of decimal numbers and/or mixed decimals.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Add whole, mixed, and/or decimal numbers.
2. Divide whole, mixed, and decimal numbers.

Steps to Success

1. To find the average of decimal numbers, follow the same procedure as finding the average of whole numbers.
2. Decimal placement should be reviewed.
3. Review rounding decimals.

ACTIVITY 1 - OUTCOME 11

Refer to the activities presented in Operations of Whole numbers, Outcome 11. Variations of these activities can be used to teach students how to find the average of decimal numbers.

MATHEMATICS
4 - 6

AREA: RATIO, PROPORTION, AND PERCENT

OUTCOMES:
1. **Use ratios to compare numbers.**
2. **Use ratio symbols to express two numbers.**
3. **Find equivalent ratios.**
4. **Determine proportions.**
5. **Solve a proportion in which a numerator or denominator is unknown.**

NOTES FOR THE TEACHER

Prerequisites for Students

1. Identify numerators and denominators.
2. Solve simple multiplication and division problems.
3. Know equivalent fractions.

Steps to Success

1. A ratio compares numbers while a proportion reveals equal ratios.
2. Several objects, such as pencils and chalk are needed.
3. The method of cross product is the easiest way to determine proportions and missing numbers in proportions.
4. Advanced planning of examples for practice by the students would be helpful.

ACTIVITY 1 - OUTCOMES 1 and 2

Write on the chalkboard:

Ratio: a way of comparing numbers
Symbols: - (a fraction bar) or : (colon)
Discuss the meaning of ratio and symbols.
Example: 2 balls to 3 bats should be written 2:3 or $\frac{2}{3}$ and read "2 to 3" in either form.

ACTIVITY 1 - OUTCOMES 1 and 2 (Cont'd)

Have the students write the ratios of:

5 pencils to 2 books 5:2 or $\frac{5}{2}$

7 candy bars to 4 children 7:4 or $\frac{7}{4}$

Have the students write the number of girls in the class to the number of boys in the class as a ratio.

ACTIVITY 2 - OUTCOMES 3 and 4

Write $\frac{1}{2}$, $\frac{2}{4}$, $\frac{3}{6}$ on the chalkboard.

Explain that the ratios of $\frac{1}{2}$, $\frac{2}{4}$, and $\frac{3}{6}$ are equivalent fractions. Therefore, they are equal ratios. To illustrate, place one pencil and 2 pieces of chalk on a table. The ratio of pencil to chalk is 1 to 2 or $\frac{1}{2}$. Place another pencil and two more pieces of chalk on the table. You now have 2 pencils and 4 pieces of chalk. Thus 2 to 4 or $\frac{2}{4}$ is the ratio.

Place one more pencil and two more pieces of chalk on the table.. The results will be 3 pencils to 6 pieces of chalk. The ratio is 3:6 or $\frac{3}{6}$. Therefore, $\frac{1}{2}$, $\frac{2}{4}$, $\frac{3}{6}$, are equivalent (equal) fractions.

Illustrate equal ratios on the chalkboard.

Example: $\frac{1}{3}$, $\frac{2}{6}$,, $\frac{3}{9}$ for example.

o 1:3 or $\frac{1}{3}$
***

oo 2:6 or $\frac{2}{6}$
******

ooo 3:9 or $\frac{3}{9}$
****

ACTIVITY 2 - OUTCOMES 3 and 4 (Cont´d)

Tell the students that a proportion is an equation stating that two ratios are equal. $\frac{1}{2} = \frac{2}{4}$ or $\frac{1}{3} = \frac{3}{9}$ are proportions.

Cross products of a proportion are equal.

Example: $\frac{1}{2} = \frac{2}{4}$ are proportions because numerator 1 times denominator 4 equals 4 and denominator 2 times numerator 2 equals 4.

Example: $\frac{2}{6} = \frac{3}{9}$ are proportions because 6 x 3 = 18 and 2 x 9 = 18. Both products are 18.

ACTIVITY 3 - OUTCOME 5

Since cross products of a proportion are equal, They can be used to find a missing number in a proportion.

Example: $\frac{8}{12} = \frac{6}{?}$ Cross products 8 x y = 12 x 6. Multiply 12 x 6. The product is 72. Divide the product 72 by 8. (72 ÷ 8 = 9). 9 is the missing denominator.

$\frac{8}{12} = \frac{6}{9}$

The cross product method can be used for missing numerators, as well as missing denominators.

$\frac{y}{5} = \frac{6}{15}$ 5 x 6 = 30 thus 30 ÷ 15 = 2 $\frac{2}{5} = \frac{6}{15}$

MATHEMATICS
4 - 6

AREA: RATIO, PROPORTION, AND PERCENT

OUTCOMES:
6. Understand the vocabulary related to percents: percent, percentage, percent symbol (%).
7. Change a percent to a decimal and vice versa.
8. Change a fraction to a percent and vice versa.
9. Calculate the percent and percentage of a number.
10. Solve word problems using percents.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Understand decimal place value through hundredths.
2. Write fractions as decimals and decimals as fractions.
3. Multiply and divide decimal and whole numbers.
4. Know factors of 100 (1, 2, 4, 5, 10, 20, 25, 50).
5. Be familiar with the divisibility rules of 2, 4, 5, 10.
6. Round decimal numbers to hundredths place.

Steps to Success

1. Relate ratios, fractions, decimals, and percentage.
2. Equal ratios can be used when the denominator of the given fraction is a factor of 100.
3. When the denominator is not a factor of 100, students must divide to find the percent.
4. Although finding the percent of a number can be determined by multiplication of fractions or decimals, students may find that using decimals is easier most of the time.

ACTIVITY 1 - OUTCOMES 6, 7, and 8

Write the word "percent" and the percent symbol on the board.

Example: percent %

Stress percent means per hundredth. Point out that percent is a type of ratio that has a second number of 100. This means that a percent tells how many parts of 100 are being discussed.

Example: 7 out of 100 = 7% or 62 out of 100 = 62%

Tell students that they can write a percent from a number expressed as a decimal and a fraction based on hundredths.

$$\text{2 hundredths} \longrightarrow 0.02 = \frac{2}{100} \longrightarrow 2\%$$

$$\text{16 hundredths} \longrightarrow 0.16 = \frac{16}{100} \longrightarrow 16\%$$

$$\text{80 hundredths} \longrightarrow 0.80 = \frac{80}{100} \longrightarrow 80\%$$

Stress all fractions or decimals written in hundredths will be that percent.

Point out to the students that some decimals or fractions will be presented in tenths which can be changed to hundredths, then to percent.

Example: $0.8 = 0.80 = 80\%$ or $\frac{8}{10} = \frac{80}{100} = 80\%$

Stress to students that sometimes fractions in their lowest terms are not expressed as hundredths and must be changed to hundredths to be written as percent.

Example: $\frac{2}{5} = \frac{\_\_}{100} = \_\_\%$

You can use the cross product method to find the missing number in the proportion. $\frac{2}{5} = \frac{?}{100}$

ACTIVITY 1 - OUTCOMES 6, 7, and 8 (Cont'd)

Tell the students the procedure of changing a percent to a decimal is a reversed action.

Example: $72\% = 0.72$ or $90\% = 0.90$

$72\% = \frac{72}{100}$ $90\% = \frac{90}{100}$

The procedure for writing a percent as a fraction is more involved because 2 steps are sometimes required. Students must decide if the fractions are in lowest terms.

Example: $90\% = \frac{90}{100}$ but $\frac{90}{100}$ is not in lowest terms.

Both 90 and 100 can be divided by 10. 90 divided by 10 is 9. 100 divided by 10 is 10. 90% equals $\frac{90}{100}$ which in lowest terms is $\frac{9}{10}$

You can help students write fractions in lowest terms by reviewing the factors of 100. (1, 2, 4, 5, 10, 20, 25, 50, 100). Also recall the rules of divisibility by 2, 4, 5, and 10 to help students decide whether the numerator can be divided by a factor of 100.

Exception: Sometimes fractions cannot be changed to hundredths. Then you must use the rule of dividing the numerator by the denominator.

Example: $\frac{5}{6}$ Since 6 is not a factor of 100, you must divide 5 by 6. $6\overline{)5.}$ Remind students of the rule for annexing (adding) zeros to a whole number after adding a decimal. Since percent is based on hundredths, 2 zeros should be added.

Divide

$$\begin{array}{r} .83 \\ 6\overline{)5.00} \\ \underline{4\ 8} \\ 20 \\ \underline{18} \\ 2 \end{array}$$

Write the remainder as a fraction in lowest terms. $\frac{2}{6} = \frac{1}{3}$

Therefore $\frac{5}{6} = 0.83\frac{1}{3}$ or $83\frac{1}{3}\%$

ACTIVITY 2 - OUTCOMES 9 and 10

Tell students you will use the information of changing percent to a decimal to find the percent of a given number.

To find the percent of a number, multiply the decimal form of the percent by the number.

Example: 50% of 42   50% = 0.50

50% of 42 = 21

$$\begin{array}{r} 0.50 \\ \times\ 42 \\ \hline 100 \\ 0200 \\ \hline 021.00 \end{array}$$

Another way to find the percent of a number is shown in the example below.

Example: 50% of 42 $50\% = \frac{50}{100}$ or $\frac{1}{2}$

$$\frac{1}{2} \times \frac{42}{1} = \frac{42}{2} = 21$$

Remind students that all percents are not easily changed to fractions in lowest terms, therefore, it may be easier to work with decimals.

Sometimes it will be necessary to find what percent a given number is of another number.

Example: What percent of 30 is 6?

Write a proportion with a missing numerator.

Think $\frac{6}{30} = \frac{y}{100}$

$6 \times 100 = 600$

$600 \div 30 = 20$

Therefore 20% of 30 is 6

ACTIVITY 2 - OUTCOMES 9 and 10 (Cont'd)

There will be a number of times when percent will be used, such as sales discount, sales tax, interest, etc. It is important for the students to relate ratios, fractions, decimals, and percents.

Discuss with students how to solve reading problems using percentage.

Example: John buys a book for \$2.50. The sales tax is 8%. What is the amount of tax?

$$\begin{array}{r} \$2.50 \\ \times\ \ 0.08 \\ \hline .2000 \end{array} = \$.20$$

Round off to the nearest cent.

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOMES:
1. Write and read mass/weight symbols for customary and metric measures.
2. Weigh objects and report mass/weight in metric and customary units.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know grams and kilograms are metric units used for measuring mass.
2. Know metric abbreviations for grams (g) and kilograms(kg).
3. Know relationship between grams and kilograms (1 kg = 1000 g).
4. Know ounces and pounds are customary units used for measuring mass.
5. Know customary abbreviations for ounces (oz) and pounds (lb).
6. Know relationship between ounces and pounds (1 lb = 16 oz).
7. Practice estimating mass/weight.

Steps to Success

1. Students need repeated and varied practice with measurement.
2. Metric and customary measurement should not be taught together. The activities can be used for both.
3. Estimating before actually measuring an object helps students to use measurement in everyday situations when measurement instruments are not available.
4. An instrument for measuring weight, such as a counter balance, is necessary.

ACTIVITY 1 - OUTCOMES 1 and 2

Collect about 10 to 15 objects. Weigh each object before the activity starts. Do not let students know the mass of each object.

Divide the class into teams of three or four. Place 10 objects on the table and have each team make a list of the objects using the following chart:

OBJECT	ESTIMATE	ACTUAL MASS	DIFFERENCE

Let teams know if objects have been weighed in metric or customary measurements. Each group should agree on an estimated mass of the object and write the estimate in the appropriate column. All weights should be written using the correct abbreviation. The team should estimate the mass for each of the objects.

When each team has completed its estimations, weigh each object. If enough counter balance scales are available, each group should weigh the objects and record the actual mass themselves. If only one balance scale is available, the teacher may weigh the objects or choose students to do the weighing.

After each item is weighed, the teams should find the difference between their estimates and the actual masses.

When this exercise is completed, compare each object´s estimated mass and actual mass.

Variation: This activity can be adapted for use with all customary or metric measurements. Change the third column in the chart to reflect the type of measuring being done.

ACTIVITY 2 - OUTCOMES 1 and 2

Collect several objects to be weighed. Prepare a handout for each student listing each object to be weighed. Indicate the appropriate unit of measurement (g, kg, oz, lb) that should be used with each item in the list.

Example:

Part of your list may look like this:

Paper Cup = ____ grams (g)
Ten Pennies = ____ grams (g)
Arithmetic Book = ____ kilograms (kg)

ACTIVITY 2 - OUTCOMES 1 and 2 (Cont´d)

Set up a "mass station" in the classroom. The station should contain a counter balance scale to weigh each object. Place a few of the objects on a list at the station. Ask students to find the mass of each item on the list.

After students have found the masses of the objects, they should check their measurements with each other so that the class can come to an agreement on the mass of each item on the list.

Variation: This activity can be adapted for measuring capacity and length.

MATHEMATICS
4 - 6

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOMES:
3. Convert mass/weight within metric and customary measures.
8. Convert capacities with metric and customary units of measure.
16. Convert linear/length with metric and customary units of measure.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Multiply and divide whole numbers.
2. Practice with moving decimals to change place value.
3. Understand the metric system is based on ten.
4. Know the metric symbols.
5. Order metric units from greatest to least.
6. Know the customary measurement table.
7. Know customary abbreviations.

Steps to Success

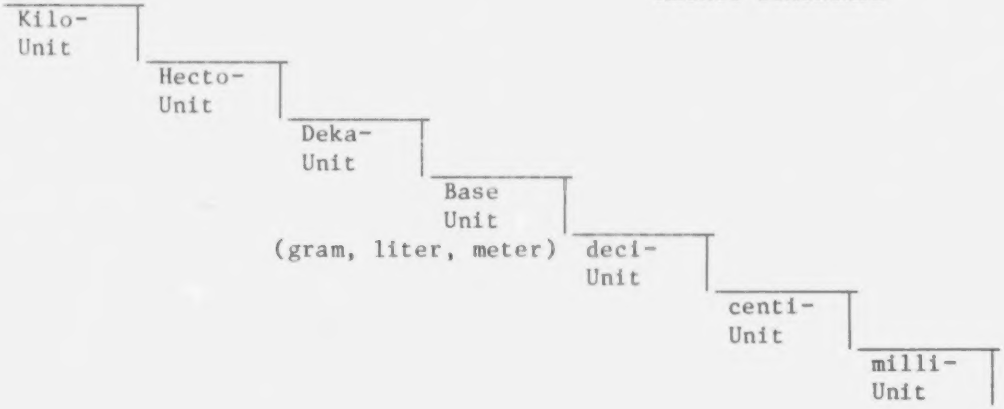
1. It is important that students understand how moving the decimal affects metric measures.
2. Students should understand the difference between the metric system (based on 10) and the customary system which follows no pattern.
3. Students should not convert from the metric system to the customary system.

ACTIVITY 1 - OUTCOMES 3, 8, and 16

Metric Measurement

Start by having students list the metric abbreviations starting with the greatest and moving to the least. Draw the following on the board filling in the steps.

METRIC STAIRCASE

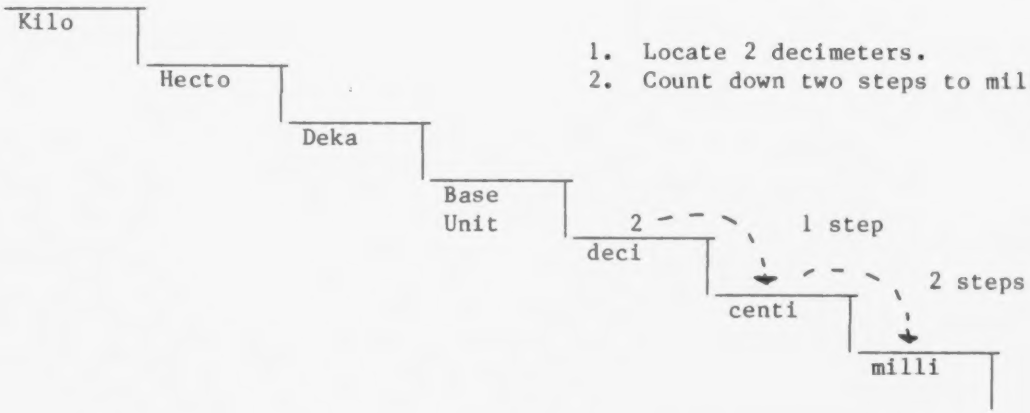

Kilo-
Unit
Hecto-
Unit
Deka-
Unit
Base
Unit
(gram, liter, meter)
deci-
Unit
centi-
Unit
milli-
Unit

Explain that when converting metric units of measure, all that needs to be done is to move the decimal point.

The students should first locate the original unit on one of the steps of the staircase. Then students should count the steps to the new unit. Move the decimal point of the original unit to the right or left as many places as there are steps. Remind students to insert zeros (0) as place holders when needed.

ACTIVITY 1 - OUTCOMES 3, 8, and 16 (Cont´d)

Example: 2 decimeters = _____ millimeters



1. Locate 2 decimeters.
2. Count down two steps to millimeters.
3. (2.00) decimeters = _____ millimeters.
4. Move the decimal 2 places to the right.
   2 decimeters = 200 millimeters.

ACTIVITY 2 - OUTCOMES 3, 8, and 16

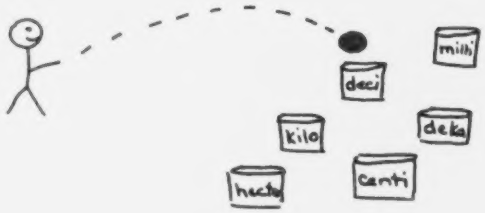
This activity is called "Toss-A-Lot" and will help students become familiar with the metric prefixes and provide practice converting into equivalent measures. The teacher will need to label six boxes or other containers with the metric prefixes and locate two bean bags that students can easily toss.

Players divide into two teams. The boxes are placed on a desk or table. One player from each team stands an equal distance from the boxes.

ACTIVITY 2 - OUTCOMES 3, 8, and 16 (Cont´d)

Each player takes a turn throwing his bean bag into a box. When a player´s bean bag lands in a box, that player´s team must convert a number of designated units into the new metric prefix. If successful, the team will receive 5 points. Each team member should be given an opportunity to toss the bean bag. If a bean bag is tossed and does not land in a box, that team does not have the opportunity to convert the measurement into an equivalent measurement, and must wait for the next player´s turn.

Example: 5 liters



Change 5 liters to _____ milliliters
5 liters = 5000 milliliters

This activity can also be used in converting equivalent measurements in customary measures.

ACTIVITY 3 - OUTCOMES 3, 8, and 16

Customary Measurement

Explain to students that the customary system is not based on ten; therefore, converting cannot be done by simply moving a decimal point.

When converting in the customary system, the students should use the following rules:

Smaller Units to Larger Units -- Divide
Larger Units to Smaller Units -- Multiply

ACTIVITY 3 - OUTCOMES 3, 8, and 16 (Cont'd)

Example 1: 36 inches = __?__ feet

The unit inches is smaller than the unit feet; therefore, division will be used.

36 inches ÷ number of inches in 1 foot = __?__ feet

$$\begin{array}{rrl} & 3 & \text{(number of feet)} \\ \text{(inches in one foot)} & 12\overline{)36} & \text{(inches)} \\ & \underline{-36} & \\ & 0 & \end{array}$$

36 inches = __3__ feet

Example 2: 2 lb. = _____ oz.

The unit pounds is larger than the unit ounces, so multiplication will be used.

2 lb. x number of oz. in 1 lb. _____ oz.

$$\begin{array}{rl} 16 & \text{oz. in one pound} \\ \underline{\times\ 2} & \text{lb.} \\ 32 & \text{oz. in 2 pounds} \end{array}$$

2 lb. = __32__ oz.

MATHEMATICS
4 - 6

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOMES:
4. Solve word problems involving mass/weight units of measure.
5. Solve word problems involving conversion of mass/weight units.
9. Solve word problems involving capacity.
10. Solve word problems involving conversion of capacity units.
17. Solve word problems involving linear units of measurement.
18. Solve word problems involving conversion of linear units.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know the metric measurement chart.
2. Know the customary measurement chart.
3. Convert within metric & customary systems.
4. Add, subtract, multiply & divide whole numbers and decimals.

Steps to Success

1. Refer to 4-6 Applications, Outcomes 1, 2, 3 and 4.

ACTIVITY 1 - OUTCOMES 4, 5, 9, 10, 17, and 18

Be sure students understand "Prerequisites" before solving word problems. Refer to 4-6 Applications, Outcomes 1, 2, 3, and 4. These activities will help students develop strategies for solving word problems.

MATHEMATICS
4 - 6

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOMES:
6. **Write and read capacity symbols for metric and customary systems.**
7. **Measure capacities and report in metric and customary units of measure.**

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know ml, cl, dl, l, dkl, hl, and kl are metric units for measuring capacities.
2. Know metric symbols for units of measuring capacity.
3. Know relationships between metric units of measure.
4. Know c., pt., qt., and gal. are customary units for measuring capacity.
5. Know abbreviations for customary units.
6. Know relationships between customary units of measure.
7. Know the customary measurement chart.

Steps to Success

1. Refer to the activities for measurement of mass.
2. Abbreviations for metric symbols vary from one text to another. Punctuation for customary symbols is optional.

ACTIVITY 1 - OUTCOMES 6 and 7

Refer to activities dealing with Time, Measurement, and Money, Outcomes 1, 2. These activities deal with symbols used in mass/weight measurement and can be adapted for symbols used in capacity measurement.

MATHEMATICS
4 - 6

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOME: 11. Select the appropriate unit of measure for measuring a specified object.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know the metric and customary terms for measuring length, mass, and capacity.
2. Know how to estimate metric and customary measurement.

Steps to Success

1. Students should have been introduced to the metric system and the customary system.

ACTIVITY 1 - OUTCOME 11

Give each student a small piece of red paper and a small piece of yellow paper.

Players pair off. The teacher should explain that the red papers mean "metric system" and the yellow papers mean "customary system."

The teacher calls out the name of an object and only the number (not the unit) of its measurement. For example: "A seven-year old child is likely to be 150 _____ tall."

Players decide whether the 150 units are likely to be a metric measurement (centimeters) or a customary measurement (inches).

Holding their hands underneath the table or behind their backs, players place the appropriate colored paper in their right fists.

At a signal, players open their fists and check their partner's answer. The class discusses the correct response. Play continues with the same steps.

ACTIVITY 2 - OUTCOME 11

This activity is called "Plate Pass." Players start by cutting out pictures of objects of various sizes from a catalog or magazine. Players then paste the cut-out pictures on their paper plates.

The teacher calls out the upper and lower limits of a specific measurement such as: "What do you have that is between 10 and 20 centimeters in length?"

Players check their plates to see if they have some object fitting this description. If so, they stand up.

The teacher calls on each standing player to justify the answer. Each correct answer yields one point.

The steps are repeated for three problems. Players then exchange plates and the game continues.

ACTIVITY 3 - OUTCOME 11

This activity is called "Jiffy Stand Up." The teacher should give each student a plain card and instruct the students to write a noun on the card, such as "water," "tree," "shoe," or "city block." The teacher will need three cards reading "meters," "liters," and "grams." The teacher will also need tokens. Bottle tops work well.

Players sit in a circle with their cards. The teacher holds up one of her cards. All players who have a card with an object to which that measurement can be applied stand up. Example: "water" goes with "liter," "tree" goes with "meter." The players must stand within a certain time span, say 3 to 5 seconds. As they stand up, they hold up their cards for view.

All players who respond correctly get a token. If a player stands by mistake, a token can be subtracted from his holdings.

After each round, players pass their cards to the right. A student must work with a different noun each round.

The 5 players with the most tokens at the end of the game are the winners.

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOMES:
12. Write and read the symbols for customary and metric measures of length.
13. Measure lengths and report in metric and customary units.
15. Estimate the length of an object given the unit of measurement.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Practice estimating.
2. Be able to read a ruler and distinquish between the metric and customary sides.
3. Know the abbreviations for metric and customary measures.
4. Know the customary measurement chart.

Steps to Success

1. Refer to the activities for Measurement (Mass) which can be adapted for this area.

ACTIVITY 1 - OUTCOMES 12 and 13

Prepare a set of cards with one direction on each. Examples: Measure the distance around your waist. Measure the distance around your thumb. Measure the distance around your head.

Ask each student to take a card, and read the direction. Before measuring, each student should write an estimate of the length including the unit of measure.

After estimating the measure, have each student measure and record the actual length.

ACTIVITY 2 - OUTCOME 15

Divide students into teams of two or three. The teacher gives a problem such as "Write down all the animals you can think of whose names start with A, B, or C, who have 4 legs and are less than 2 meters long." (armadillo, beaver, cat). "Make a list of all electric appliances whose names start with R, S, or T and which are less than 1 meter long." (radio, stereo, T.V.)

After several rounds, answers are discussed and points are awarded for correct responses.

MATHEMATICS
4 - 6

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOME: 14. Add and subtract problems involving linear measurement.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Add and subtract whole numbers and decimals.
2. Convert measurement units within the metric and customary systems.

Steps to Success

1. The students need to have practiced conversion within each measurement system.
2. In the beginning, it may be helpful to use manipulatives (rulers).

ACTIVITY 1 - OUTCOME 14

When adding or subtracting measurements, it is important to stress that measurements may need to be converted either before working the problem or after the answer is found.

Computation of measurements are the same as computation of whole numbers except for converting one unit of measure to another.

Example: No conversions needed.

$$\begin{array}{r} 6 \text{ ft. } 7 \text{ in.} \\ \underline{+\ 2 \text{ ft. } 3 \text{ in.}} \\ 8 \text{ ft. } 10 \text{ in.} \end{array} \qquad \begin{array}{r} 6 \text{ ft. } 8 \text{ in.} \\ \underline{-\ 3 \text{ ft. } 5 \text{ in.}} \\ 3 \text{ ft. } 3 \text{ in.} \end{array}$$

ACTIVITY 1 - OUTCOME 14 (Cont'd)

Example: Conversion needed after problem is solved.

  7 ft. 8 in.
+ 2 ft. 5 in.
  9 ft. 13 in. Needs to be converted to 1 ft. 1 in.
1 ft. 1 in. is added to 9 ft.

9 ft. + 1 ft. 1 in. = 10 ft. 1 in.

Example: Conversion needed before problem is solved.

  5 ft. 4 in.
- 2 ft. 8 in.

Eight (8) inches cannot be subtracted from 4 inches. It will be necessary to borrow or regroup as in subtraction of whole numbers.

4ft. 12 in.
  ~~5~~ ft. 4 in. Borrow 12 in. (1 ft.) from 5 ft.
- 2 ft. 8 in.

Add 12 inches to the 4 inches.

  4 ft. 16 in.
- 2 ft. 8 in. Subtract.
  2 ft. 8 in.

MATHEMATICS
4 - 6

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOMES: 19. Read and write money values.
20. Write fractional parts of a dollar in decimal form.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Read and write mixed decimal numbers through hundredths.
2. Know simple fractions of halves, fourths, and fifths in decimal form.
3. Recognize the reading of a decimal point in a mixed decimal as "and".

Steps to Success

1. If available, refer to Basic Skills Instructional Materials: Grade 6 for a complete explanation of Outcomes 19 and 20. (Pages 171-172, 187-189)
2. Refer to the Decimals section of this book for reading and writing mixed decimal numbers.
3. Refer to Outcome 6 in Decimals section for writing simple fractions as decimals.
4. Reading and writing money values are the same as reading and writing mixed decimals, except using the words "dollars" and "cents".
5. Money values less than one dollar are $.01-.99. Simple fractions that can be written as decimals in hundredths can be expressed as cents.

ACTIVITY 1 - OUTCOME 19

Students can already read whole numbers and decimal numbers through hundredths. When reading money values, simply combine the two processes. Remind the students that the word "and" is read at the location of the decimal point.

Example: 182 is read as "one hundred eight-two."
0.63 is read as "sixty-three hundredths." Since money less than one dollar is based on hundredths, it can be read as cents rather than hundredths. Thus 0.63 can also be read as sixty-three cents.

555

554

ACTIVITY 1 - OUTCOME 19 (Cont´d)

$182 is read as "one hundred eighty-two dollars." $0.63 is read as "sixty-three cents;" $182.63 is read as "one hundred eighty-two dollars and sixty-three cents." The word "and" separates dollars from cents.

Example: $32.57
thirty-two dollars and fifty-seven cents

Students can write money values from words to digits by remembering that the process above is done in reverse.

Example: One hundred ninety-seven dollars and forty-five cents.

Begin each money value with the dollar sign ($). Write the amount of dollars as a whole number placing a decimal point for "and." Then write the total amount of cents.

Example: One hundred ninety-seven dollars and forty-five cents.
$197.45
The decimal point separates dollars from cents.

ACTIVITY 2 - OUTCOME 20

Students should be able to write the simple fractions 1/2, 1/4, 3/4, and 1/5, 2/5, 3/4, 4/5 as decimal numbers. Remind students that cents are based on hundredths.

Example: 1/2 of a dollar = 50/100 = 0.50 therefore 1/2 of a dollar = $.50

2/5 of a dollar = 40/100 = 0.40 therefore 2/5 of a dollar = $.40

Students can continue to convert the other fractional parts of a dollar to money values.

MATHEMATICS
4 - 6

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOMES: 21. Add and subtract money values.
22. Multiply and divide money values.
25. Solve word problems involving money.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Add, subtract, multiply, and divide mixed decimal numbers.

Steps to Success

1. Adding, subtracting, multiplying, and dividing money values will follow the steps of adding, subtracting, and multiplying mixed decimal numbers using a dollar sign to indicate money. Refer to Outcomes 7, 8, and 9 in the section on Decimals.
2. Refer to Basic Skills Instructional Material: Grade 6 for more information on adding and subtracting money values. (pp. 181-182)
3. Looking for key questions and words will benefit the students in determining the operation to be used in solving word problems.
4. Help students understand word problems by visualizing and retelling each problem.
5. Encourage students to reread the problem and concentrate on the important facts.
6. Remember multiplication and division can be considered repeated addition and subtraction. Answers to word problems can be obtained this way, but encourage students to use the simpler method of multiplication and division.

ACTIVITY 1 - OUTCOMES 21 and 22

Students should be able to relate the calculating of mixed decimals to the calculating of money values. Problems of money are indicated by a dollar sign and operations are worked the same as with mixed decimal numbers.

```
Example:   1.81 becomes  $1.81      13.83 becomes  $13.83
           2.92           2.92     -  8.74         -  8.74
         +  .38         +  .38     -------         -------
         ------         ------       5.09           $5.09
           5.11          $5.11

           8.24 becomes  $8.24        5.24 becomes   $ 5.24
         x    5         x    5     6)31.44         6)$31.44
         ------         ------       30              30
          41.20         $41.20        1 4             1 4
                                      1 2             1 2
                                       24              24
                                       24              24
```

ACTIVITY 2 - OUTCOME 25

Guide students to read, visualize, reread, and tell a word problem before attempting to solve the problem. Determine the operation and plan a solution for the problem.

Example: A baseball team spent $275.00 on uniforms and $175.45 on equipment.

Question: How much did the team spend?

Read and reread the problem. Ask what question is to be answered. (How much was spent?) Ask other leading questions. "What do you know?" (the amount spent on uniforms and the amount spent on equipment) "Do you compare the two amounts or join them?" (join them) The operation would be addition. Solution:

```
  $275.00
+  175.45
---------
  $450.45
```

Other problems involving subtraction, multiplication, and division should be planned.

Example: Karen will buy 6 composition notebooks for $.89 each. How much will Karen spend?

ACTIVITY 2 - OUTCOME 25 (Cont'd)

The questions following the reading and rereading will be adjusted to this problem.

Question: If one notebook costs \$.89, how much will 6 cost?

Some students may suggest to add \$.89 six times. Tell the students that the answer can be obtained this way, but a simpler method would be multiplication. Solution:

$$\begin{array}{r} \$.89 \\ \underline{\times\ \ 6} \\ \$5.34 \end{array}$$

MATHEMATICS
4 - 6

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOMES: 23. Name the value of a set of coins and/or bills.
24. Determine and make change.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know coin denominations.
2. Make change with amounts less than $1.00.

Steps to Success

1. Refer to K-3, Time, Measurement, and Money, Outcomes 17-21, section for values of coins and making change for amounts less than $1.00.
2. Refer to Basic Skills Instructional Materials: Grade 6 for making change up to $20.00 (pp. 221-222).
3. Obtain play money for coins and bills or make money from construction paper.

ACTIVITY 1 - OUTCOME 23

Refer to K-3 section for activities involving the recognition of common coins and bills.

ACTIVITY 2 - OUTCOME 24

Refer to Basic Skills Instructional Materials: Grade 6 (pp. 221-22) for making change up to $20.00.

ACTIVITY 3 - OUTCOMES 23 and 24

All students should be able to recognize common coins and bills. If possible, have one of each (penny, nickel, dime, quarter, and bills of 1, 5, 10, and 20 denominations) available for students to identify.

ACTIVITY 3 - OUTCOMES 23 and 24 (Cont´d)

Give each student some play money of each denomination. Using this "money," have students practice giving change for stated amounts.

Example: Determine the change from a $5 bill for a purchase of $2.98.

Help students recognize that the operation of subtraction will give the amount of change ($5.00 - 2.98). The change should be $2.02. This would be 2 one-dollar bills and 2 pennies.

$$\begin{array}{r} \$5.00 \\ \underline{-2.98} \\ \$2.02 \end{array}$$

Continue similar activities using larger amounts of money.

MATHEMATICS
4 - 6

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOME: 26. Determine sales tax on a purchase using a sales tax table.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Compare money values.
2. Read a chart or table.
3. Add and multiply simple money values.
4. Round decimals to hundredths.
5. Change percents to decimals.

Steps to Success

1. A copy of a sales tax table should be available to students.
2. Purchases up to $1.00 can be found directly from the sales tax table.
3. Tax on purchases involving both dollar(s) and cents is found by adding the tax for each dollar and the tax for the cents.
4. Tax on purchases of even dollar amounts ($2.00 and more) is found by multiplying the number of dollars by the sales tax for $1.00.

ACTIVITY 1 - OUTCOME 26

If a tax table is not available for students, construct one.

Example: 7% Sales Tax Table

Amount of Purchase	.08-.21	.22-.35	.36-.49	.50-.64	.65-.78	.79-.92	.93-1.00
Tax	.01	.02	.03	.04	.05	.06	.07

ACTIVITY 1 - OUTCOME 26 (Cont'd)

Begin by using amounts that can be found on the table.

Example: A purchase of $.73 using a 7% Sales Tax Table

What is the sales tax of a purchase of $.73? Start by locating on the table the two amounts between which $.73 will fall. Having found this (.65-.78), look in the row below for tax. If the tax table is vertical, look across. This amount will carry a $.05 tax. Students should continue finding other taxes for prices under $1.00.

ACTIVITY 2 - OUTCOME 26

Point out to students that when purchases amount to more than $1.00, you must use addition to find the total tax.

Example: A purchase of $1.47 using a 7% Sales Tax Table

First locate $1.00 on the tax table. The tax is $.07. Now locate the tax for $.47. This amount will be $.03. Find the total of $.07 (for $1.00) and $.03 (for $.47). $.07 + .03 = $.10. The sales tax for $1.47 is $.10.

ACTIVITY 3 - OUTCOME 26

For purchases over $1.99, stress that students should multiply the number of dollars by the sales tax for $1.00.

Example: A purchase of $12.35 using a 7% Sales Tax Table

Since the tax for $1.00 is $.07, multiply .07 by the total number of dollars. Thus, .07 x 12 = .84. The sales tax for $12 will be $.84. Now locate on the table the amount of sales tax for $.35. This will be $.02. Total the two amounts ($.84 for $12 and $.02 for $.35). $.84 + $.02 = $.86. The sales tax for $12.35 is $.86.

ACTIVITY 4 - OUTCOME 26

As an extension, discuss the simple process of multiplication of sales tax by amount of purchase for the total sales tax. The two prerequisites necessary to complete this process are rounding decimal numbers to hundredths and changing percents to decimals.

ACTIVITY 4 - OUTCOME 26 (Cont´d)

Example: A purchase of $6.89 at 6% sales tax.

First change 6% to a decimal number of .06. Then multiply this by $6.89.

$$\begin{array}{r} \$6.89 \\ \underline{\text{x }.06} \\ \$.4134 \end{array}$$

Round $.4134 to the nearest hundredth ($.41). Thus, the sales tax for $6.89 will be $.41.

The teacher may carry each activity a step further and find the total cost including the purchase price and the sales tax.

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOME: 27. Calculate total price of an item that has been discounted by a percentage.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Change percent to decimal.
2. Multiply decimal numbers by decimal numbers.
3. Round off decimal numbers and money values to the nearest hundredths (nearest cent).
4. Subtract money values.

Steps to Success

1. A discount is an amount that is subtracted from the original cost.
2. A discounted price is the amount after the discount has been subtracted from the original price.
3. Multiplication of percent by money values will involve rounding numbers to the nearest cent. This is the same as rounding decimal numbers to the nearest hundredths.

ACTIVITY 1 - OUTCOME 27

To find the discounted price of an item, begin by stressing the difference in discount and discounted price. The discount is the percentage to be taken off the original price. The discounted price is the amount the item costs after the discount has been subtracted.

Example:

Sue works for Uptown Clothing. She receives a 15% employee discount. Sue buys a dress with an original price of $95.00. How much will Sue pay after her employee discount?

ACTIVITY 1 - OUTCOME 27 (Cont´d)

Solution:

Original cost - discount = Sue´s cost

Step 1: Find the amount of the discount. Sue receives 15% discount. Write 15% as a decimal number (.15) and multiply it by the original cost.

original cost	$95.00
discount	x .15
	47500
	9500
amount of discount	$14.2500

Step 2: Subtract the amount of discount from the original cost.

original cost	$95.00
amount of discount	- 14.25
discounted price	$80.75

Sue would pay $80.75 for the dress.

ACTIVITY 2 - OUTCOME 27

What is the discount and what is the new cost of each item?

Example: 20% discount on a shirt that sells for $15.95.

Solution: price x discount % = discount
$15.95 x .20 = discount
$3.19 = discount

price - discount = new cost
$15.95 - $3.19 = new cost
$12.76 = new cost

ACTIVITY 2 - OUTCOME 27 (Cont'd)

Example: 18% discount on a tennis racket that sells for $75.00.

Solution:
price x discount % = discount
$75.00 x .18 = discount
$13.50 = discount

price - discount = new cost
$75.00 - $13.50 = new cost
$61.50 = new cost

Example: 25% discount on a football jersey that sells for $14.76.

Solution:
price x discount % = discount
$14.76 x .25 = discount
$3.69 = discount

price - discount = new cost
$14.76 - $3.69 = new cost
$11.07 = new cost

MATHEMATICS
4 - 6

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOME: 28. Calculate simple interest.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Write percent as decimal number.
2. Multiply decimal numbers by decimal numbers and mixed decimal numbers.
3. Add money values that contain decimal numbers.

Steps to Success

1. Interest can be money paid by a money institution to a customer for the use of the customer´s money.
2. Interest can be money charged by a money institution or a business to a customer for borrowing money or purchasing an item on credit.
3. Interest rates are always expressed as percents.
4. Interest paid or charged for one year involves only multiplication.
5. Interest paid for more than one year involves multiplication and addition.
6. Writing a number sentence to find a solution will benefit students.

ACTIVITY 1 - OUTCOME 28

Interest can be money paid to a customer by a money institution for using the customer´s money. Interest is paid for money deposited into a savings account.

Example:

The First National Bank pays interest at the rate of 5% per year on savings accounts. Fran has $200 in a savings account at this bank. How much interest would Fran receive after one year? Write a number sentence and solve this problem.

ACTIVITY 1 - OUTCOME 28 (Cont'd)

Solution: Amount of savings x rate of interest = interest
$200 x 5% = interest

Write 5% as a decimal and multiply.
$200 x .05 = interest
$10.00 = interest

Fran would receive $10.00 interest at the end of one year. Her total account (savings and interest) would now equal $210.00.

ACTIVITY 2 - OUTCOME 28 (For higher achievers)

John opens a savings account at a local bank with $100. The bank pays 5% interest each year. How much money will John have at the end of two years?

Instruct students to first find the interest for one year.

Amount of savings x rate of interest
$100.00 x .05 (5% as decimal number)
$5.00 amount of interest for one year

Instruct students to add the $5.00 to the $100.00 before finding the interest for the second year. $100.00 + $5.00 = $105.00 at the end of the first year. Now follow the same procedure to find interest for the second year.

Amount of savings x rate of interest
(after one year) $105.00 x .05 (5% as decimal)
$5.25 amount of interest for the second year
Amount of savings after 2 years
$105.00 + 5.25 = $110.25

Show students that the steps above can be written using numbers and symbols only.

Step 1: $100.00 x .05 = N
$5.00 = N
$100.00 + $5.00 = $105.00

Step 2: $105.00 x .05 = N
$5.25 = N
$105.00 + 5.25 = $110.25

ACTIVITY 3 - OUTCOME 28

Interest charged to a customer for an item purchased or money borrowed is calculated in the same way as interest paid to a customer.

Example:

Jenny borrows $700 to buy stereo equipment. The bank charges 19% interest per year on loans. How much interest does Jenny pay the bank for this loan of one year? Write a number sentence.

Amount of loan x rate of interest = Interest
$700 x .19 (19% as decimal number) = $133.00 (amount of interest paid)

Number sentence: $700 x .19 = N
$133.00 = N

MATHEMATICS
4 - 6

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOME: 29. Compute hourly wages with no deductions.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Multiply money values by a whole number.
2. Add money values.
3. Write simple number sentences.

Steps for Success

1. If available, refer to Basic Skills Instructional Material: Grade 6 (p. 229) for complete explanation.
2. Refer to 4-6, Applications for word problems.
3. Writing number sentences for the solution can help clarify the operation to be worked.
4. Reading and rereading can help students locate needed information for a solution.
5. Students can relate to this on a personal basis (money they earn for after-school jobs, allowance, etc.)

ACTIVITY 1 - OUTCOME 29

Refer to Basic Skills Instructional Material: Grade 6 (p. 229)

ACTIVITY 2 - OUTCOME 29

Use sample problems like the following to help students understand computation of hourly wages.

Gloria worked 144 hours this month. She earns $5.50 an hour. How much did she earn this month? Write a number sentence and solve it.

ACTIVITY 2 - OUTCOME 29 (Cont´d)

Ask students to locate information needed to solve the problem. Ask leading questions. "How many hours did she work?" "How much did she earn for one hour?"

Form a number sentence.

hours Gloria worked x pay per hour = total paid
144 x $5.50 = N
$792.00 = N
Gloria earned $792.00.

Dan has two jobs after school. He walks his neighbor´s dog and cuts grass. One week he spent 5 hours walking the dog and 6 hours cutting grass. If he is paid $1.25 an hour, how much did he earn that week? Write a number sentence and solve.

Step 1: Find the total number of hours he worked.

Step 2: Multiply that total by the pay per hour.

5 hours + 6 hours = 11 hours   1) 5 + 6 = N
11 = N

11 hours x $1.25 per hour   2) 11 x $1.25 = Q
$13.75 = Q

ACTIVITY 3 - OUTCOME 29

Ask if any students have jobs after school and if they would like to tell the class about their jobs. Let the class figure the wages for a specific number of hours. Let them pretend to be employed and figure their own weekly wages.

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOME: 30. Use comparative shopping skills in solving consumer problems.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Add, subtract, multiply, and divide whole numbers and money values.
2. Compare numbers.
3. Read charts.
4. Write number sentences for solutions.

Steps to Success

1. If available, refer to Basic Skills Instructional Material: Grade 6 (pp. 223-225) for an explanation for this outcome.
2. Computing a unit price (price for one item) will help determine the best buy.

ACTIVITY 1 - OUTCOME 30

Refer to Basic Skills Instructional Materials: Grade 6 (pp. 223-225)

ACTIVITY 2 - OUTCOME 30

Use problems like the following to help students understand comparative shopping skills.

John can buy six pencils for $.90 or a package of eight pencils for $1.04. Which is the best buy for John?

Stress that the lower price is not always the best buy. To illustrate the best buy first find the unit price for pencils in each set. Write a number sentence for each set and solve.

ACTIVITY 2 - OUTCOME 30 (Cont'd)

6 pencils = \$.90 and 8 pencils = \$1.04

\$.90 ÷ 6 = \$.15 and \$1.04 ÷ 8 = \$.13

Compare the two unit prices. Since each of the 6 pencils cost \$.15 and each of the 8 pencils cost \$.13, we would conclude that 8 pencils for \$1.04 is the best buy.

ACTIVITY 3 - OUTCOME 30

At a Back-To-School Sale, Lois found the following advertisement in the local newspaper.

Back-To-School Items

pencils - 10¢ each
erasers - 2 for 5¢
paper - 75¢ per package
rulers - 25¢ each
crayons - 39¢ a box

School Special \$3.00

A package of 10 pencils, 10 erasers, 2 packages of paper, 1 ruler, 1 box of crayons

ACTIVITY 3 - OUTCOME 30 (Cont´d)

Lois needs 10 pencils, 10 erasers, 2 packages of paper, 1 ruler, and 1 box of crayons. How much would Lois save if she bought the School Special?

Guide students to find the total cost of the items if purchased separately.

Example:

10 pencils at 10¢ each (10 x .10) = $1.00
10 erasers at 2 for 5¢ (5 x .05) = .25
2 packages of papers at 75¢ each (2 x .75) = 1.50
1 ruler at 25¢ each (1 x .25) = .25
1 box of crayons at 39c (1 x .39) = .39
TOTAL PRICE = $3.39

Bought separately Lois would spend $3.39. The special is $3.00. She can save $.39 by buying the special.

MATHEMATICS
4-6

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOMES:
31. Tell time using a circular or digital clock.
32. Determine elapsed time.
33. Use conversion facts of time measures to solve word problems.
34. Solve word problems involving time zones.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Be able to locate east and west on a map.
2. Be able to add or subtract clock time.

Steps to Success

1. Relate background information before beginning these activities. Use a World Map.

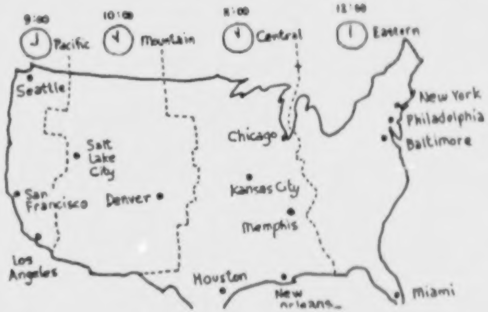
2. There are twenty-four time zones for the world. The earth is continuously rotating from west to east, moving different parts of the world into daylight. As you move from east to west across each time zone, you must subtract one hour. As you move from west to east, you must add one hour for each time zone.

ACTIVITY 1 - OUTCOMES 31, 32, and 33

Refer to Basic Skills Instructional Materials: Grade 6 (pp. 192-196).

ACTIVITY 2 - OUTCOME 34

Use a United States map with time zones to explain that the continental United States has four time zones:


9:00
Pacific
10:00
Mountain
11:00
Central
12:00
Eastern
Seattle
Salt Lake City
San Francisco
Denver
Los Angeles
Chicago
Kansas City
Memphis
Houston
New Orleans
New York
Philadelphia
Baltimore
Miami

List several cities and have students name the time zone for each city.

Example: Seattle - Pacific
New York - Eastern

Remind students:
As you move east, add 1 hour for each time zone.
As you move west, subtract 1 hour for each time zone.

Tell students that the clock in each time zone can help them decide whether to add or subtract time.

Have students use the map to answer questions like the following:

1. What is the time difference between Baltimore and Denver?
2. If it is 2:00 a.m. in Baltimore, what time is it in Denver?
3. If it is 4:00 p.m. in Seattle, what time is it in Memphis?
4. If an airplane leaves New York at 8:40 a.m. and arrives in San Francisco 7 hours later, what time will it be in San Francisco when the airplane arrives?

MATHEMATICS
4 - 6

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOMES:
33. Use conversion facts of time measures to solve word problems.
35. Solve problems involving weeks, months, and/or days.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Add and subtract whole numbers.
2. Understand clock time.
3. Know the following table.

Table of Time Measures

1 minute = 60 seconds
1 hour = 60 minutes
1 day = 24 hours
1 week = 7 days
1 year = 52 weeks
1 year = 12 months

Steps to Success

1. After a period of time students should not have to use the table to convert. They should have learned the equivalents.
2. Students should be given practice converting hours to minutes, minutes to seconds, days to hours, days to weeks, etc.
3. Refer to Basic Skills Instructional Materials: Grade 6 (pp.194-197).

ACTIVITY 1 - OUTCOME 33

Begin with a simple word problem like the one below.

John played tennis for 2 hours and 24 minutes on Monday. He played 1 hour and 48 minutes on Tuesday. What was the total amount of time John played tennis on Monday and Tuesday?

Help students determine what calculation to use to solve the problem.

Using the key word "total" ask, "What must we do to find a total?" Students should decide they must add.

Explain to students that in order to add time we must place time units in the correct column just as whole numbers must be lined up by place value.

Example:

$$\begin{array}{rrcrl} & 2 & \text{h} & 24 & \text{min.} \\ + & 1 & \text{h} & 48 & \text{min.} \\ \hline \end{array}$$

Have students add the minutes and then the hours.

$$\begin{array}{rrcrl} & 2 & \text{h} & 24 & \text{min.} \\ + & 1 & \text{h} & 48 & \text{min.} \\ \hline & 3 & \text{h} & 72 & \text{min.} \end{array}$$

After adding, point out that in the minutes column we have more than 1 hour. Ask leading questions such as:

"How many minutes in an hour?" (60)
"How many hours should we add to the hour column?" (1)
"How many minutes will be left in the minutes column?" (12)

$$\begin{array}{rrcrl} & 2 & \text{h} & 24 & \text{min.} \\ + & 1 & \text{h} & 48 & \text{min.} \\ \hline & 3 & \text{h} & 72 & \text{min.} \end{array} = 4 \text{ h } 12 \text{ min.}$$

Help students understand they are regrouping minutes and hours like regrouping ones, tens, and hundreds, in whole numbers.

Refer to the same word problem and ask, "How much more time did John spend playing tennis on Monday than on Tuesday?"

Help students understand that they must subtract to find the difference.

ACTIVITY 1 - OUTCOME 33 (Cont´d)

Remind students to place the larger amount of time on top. (To determine the larger amount of time they must look only in the hour column.)

Have students write the problem.

Example:

$$\begin{array}{rrlrl} & 2 & \text{h} & 24 & \text{min.} \\ - & 1 & \text{h} & 48 & \text{min.} \\ \hline \end{array}$$

Students should find they cannot subtract 48 min. from 24 min.

Ask: "How can the problem be rewritten to be able to subtract?"

Lead students to regroup hours into minutes. (1 hour = 60 minutes)

Example:

$$\begin{array}{rrlrlcrlrl} & 1 & \text{h} & 60 & \text{min.} & & & & & \\ & \cancel{2} & \text{h} & 24 & \text{min.} & = & 1 & \text{h} & 84 & \text{min.} \\ - & 1 & \text{h} & 48 & \text{min.} & = & 1 & \text{h} & 48 & \text{min.} \\ \hline & & & & & & & & 36 & \text{min.} \end{array}$$

Continue with word problems involving seconds, minutes, hours, and/or days. Advanced students could work with problems involving three-columns. (Involves regrouping twice)

Example:

$$\begin{array}{rrlrlrl} & 2 & \text{h} & 20 & \text{min.} & 15 & \text{sec.} \\ + & 4 & \text{h} & 48 & \text{min.} & 45 & \text{sec.} \\ \hline \end{array}$$

ACTIVITY 2 - OUTCOME 35

Refer to Basic Skills Instructional Materials:- Grade 6 (pp. 194-197).

AREA: TIME, MEASUREMENT, AND MONEY

OUTCOME: 36. Name the boiling point of water and normal body temperature in degrees Celsius and Fahrenheit.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Read a thermometer in degrees.
2. Know the freezing point and normal body temperature in both degrees Fahrenheit and Celsius.

Steps to Success

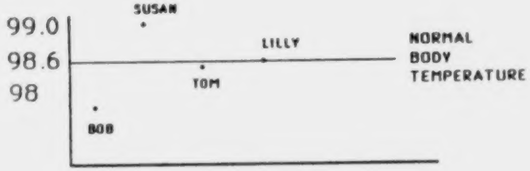
1. Students should understand that 90° is very warm, 60° is cool, and 30° is cold in degrees Fahrenheit.
2. Students should understand that 35° is very warm, 20° is cool, and 0° is cold in degrees Celsius.

ACTIVITY 1 - OUTCOME 36

Remind students that the normal body temperature is 98.6° Fahrenheit.

Take the temperature of each student and place each temperature on a graph to make comparisons to the normal body temperature of 98.6° Fahrenheit.

Example:

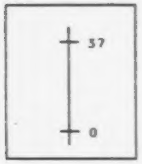


ACTIVITY 2 - OUTCOME 36

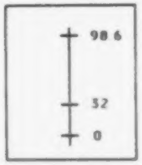
Make two paper thermometers. Let one thermometer show Celsius degrees and the other thermometer show Fahrenheit degrees.

Example:

Celsius

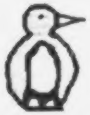


Fahrenheit

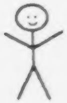


Prepare symbols representing the freezing point of water and the normal body temperature.

Example:



freezing point

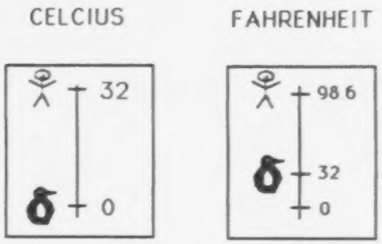


normal body temperature

ACTIVITY 2 - OUTCOME 36 (Cont'd)

Ask students to place the symbols on the appropriate degree markings on both the Celsius and Fahrenheit thermometers.

Example:


CELCIUS
32
0
FAHRENHEIT
98 6
32
0

MATHEMATICS
4 - 6

AREA: GEOMETRY

OUTCOMES:
1. Recognize, name, and illustrate squares, rectangles, circles, radius, diameter, circumference, triangles, trapezoids, angles, right angles, acute angles, obtuse angles, points, line segments, rays, parallel lines, perpendicular lines, intersecting lines.
3. Recognize, name, and illustrate cubes, rectangular solids, spheres, cylinders, cones.
4. Identify parts of a solid figure.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Be familiar with geometric terms and figures.
2. Know the difference between one dimensional and three dimensional figures.

Steps for Success

1. The teacher will need to collect materials before starting the activities.

ACTIVITY 1 - OUTCOMES 1 and 3

The purpose of these activities is to give students practice with identifying geometric shapes and terms. The activities can be used with small groups or with the whole class using an overhead projector.

NAME THE FIGURE

Materials needed: Two sets of 15 or more cards are needed. One set should consist of geometric figures and the other set should consist of the corresponding geometric figure names.

ACTIVITY 1 - OUTCOMES 1 and 3 (Cont´d)

Shuffle the cards separately. Place cards with drawings face down on the table. Deal five vocabulary cards to each player. The first player turns up one figure card. If he has the corresponding name card, he may lay both cards before him. If he cannot match cards, he must draw one card from the figure stack. If he still cannot make a match, the figure card is placed face down at the bottom of the deck from which it came. At the end of the playing time or when one player has no more cards, the figure cards which each player has matched are counted. The winner is the player with the largest number of matched cards.

ACTIVITY 2 - OUTCOMES 1, 3, and 4

VARIATION: GEOMETRY CONCENTRATION

The same cards used in Activity 1 can be used for this Activity.

Spread the cards out face down. The first player turns over two cards. If the two cards match, he keeps them and turns over another pair. If the cards do not match, they are returned to their face down positions on the table. The other player follows the same steps. Play continues until all cards have been correctly matched. The player who has the largest number of pairs of matching cards is the winner.

Parts of solid figures such as the edge or face can be included in the two previous activities.

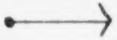
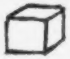
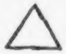
ACTIVITY 3 - OUTCOMES 1, 3, and 4

Geometry Checkers

Use a commercial checkerboard or make one of your own. Mark small gummed labels as shown on the diagram and put them on the red squares of each half. Make sure to position the labels so that the so the words face the player at each side of the board.

ACTIVITY 3 - OUTCOMES 1, 3, and 4 (Cont'd)

Example:

	CUBE				
ANGLE				HEXAGON	
					LINE

The rules for the game of checkers are used. Before a player can move a checker, he must name the shape or say the word in the square on which it will land. If the player makes an error, he loses his turn.

AREA: GEOMETRY

OUTCOME: 2. Use instruments to increase precision in drawing geometric figures.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Identify basic geometric shapes (square, triangles, rectangles).
2. Know characteristics of squares, triangles, and rectangles.
3. Understand terms: parallel and perpendicular.

Steps to Success

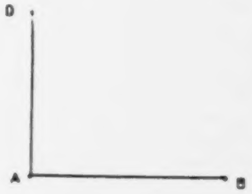
1. Give students practice in drawing geometric figures with and without instruments.

ACTIVITY 1 - OUTCOME 2

A ruler should be used to do all activities.

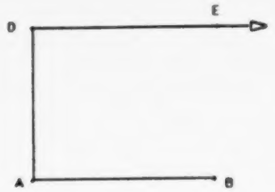
Example: Draw a square with each side being 3 centimeters long.

Step 1: Draw line segment AB 3 cm long. Draw a perpendicular line at point A. Measure 3 cm along that line and make a mark, D.

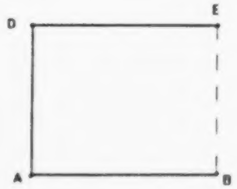


ACTIVITY 1 - OUTCOME 2 (Cont´d)

Step 2: Draw DE parallel to line segment AB.

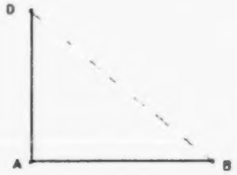


Step 3: Draw a perpendicular line segment to connect point E and point B.



The same procedure can be used to draw a rectangle given the length and width measurements.

Triangles can be drawn also if, after Step 1, points D and B are connected.



MATHEMATICS
4 - 6

AREA: GEOMETRY

OUTCOME: 5. Find the area of a square, rectangle, circle, triangle.

NOTES FOR THE TEACHER

Prerequisites for Students

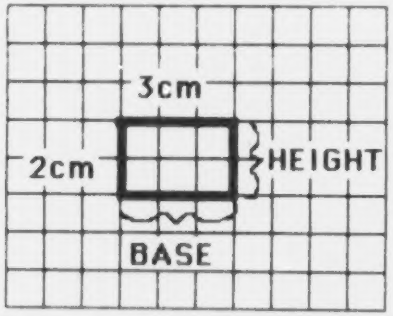
1. Multiply and divide whole numbers and decimals.
2. Measure line segments.
3. Identify a square, rectangle, circle, and triangle.
4. Identify length, width, base, height, and radius.
5. Estimate the area of figures.
6. Square numbers.

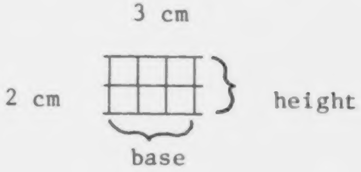
ACTIVITY 1 - OUTCOME 5

Have students find areas of rectangles and squares.

Give each student a piece of paper marked in square centimeters paper. Have the students draw a rectangle on their paper like the example.

Example:





ACTIVITY 1 - OUTCOME 5 (Cont´d)

The amount of surface inside a shape is called the "area." Ask students to count the number of square centimeters inside the rectangle they drew to find its area. The drawn rectangle has an area of 6 square centimeters of $6cm^2$.

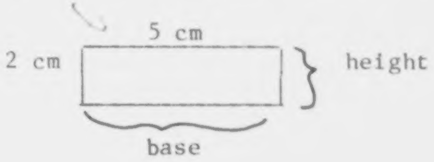
Many times we want to know the area of a figure that is not on square centimeter paper. To find the area of these figures we must use a formula to compute area.

The formula used for finding area is:

AREA = BASE X HEIGHT

Model to students on the chalkboard how the formula can be used.

Example:



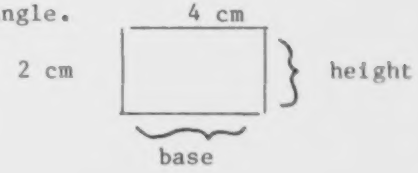
AREA = BASE X HEIGHT
AREA = 5 cm x 2 cm
AREA = $10cm^2$

The same basic formula can be used to find the area of a square.

ACTIVITY 2 - OUTCOME 5

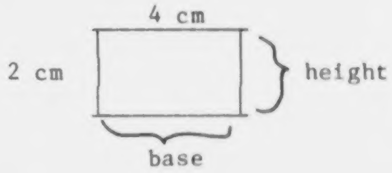
Have students find areas of triangles.

On a piece of construction paper construct the following rectangle.



ACTIVITY 2 - OUTCOME 5 (Cont´d)

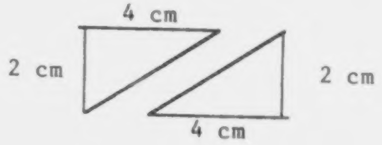
Draw a line through the rectangle connecting opposite corners.



Ask students to find the area of the rectangle using the area formula.

$$\text{AREA} = \text{BASE} \times \text{HEIGHT}$$
$$8\text{ cm}^2 = 4\text{ cm} \times 2\text{ cm}$$

Use scissors to cut the rectangle on the dividing line to make two triangles.



Explain that cutting the original rectangle in half results in two triangles, each of which has half the area of the original rectangle. Therefore, the area of one of the triangles is the area of the rectangle divided by 2.

Example: The area of the triangle is $\frac{4\text{cm} \times 2\text{cm}}{2} = \frac{8\text{cm}^2}{2} = 4\text{cm}^2$

The formula for finding the area of a triangle is:

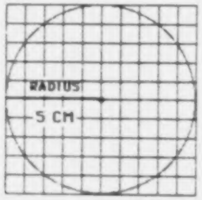
$$\text{AREA} = \frac{\text{Base} \times \text{Height}}{2}$$

ACTIVITY 3 - OUTCOME 5

Divide the students into small groups of two or three. Give each group a piece of square centimeter paper with a circle (radius = 5cm.) drawn on it.

Let each group estimate the area of the circle. Most groups will try to count the squares inside the circle. However, since many of the squares are cut in sections by the circle, it is impossible to be accurate.

Example:



Because counting squares to find a circle´s area is impossible, the formula for finding a circle´s area should be used.

Formula: AREA of a Circle = $\text{Radius}^2 \times 3.14$

Use the new formula to find the circle´s area.

$$\begin{aligned} \text{AREA} &= \text{Radius}^2 \times 3.14 \\ &= 5^2 \times 3.14 \\ &= 25 \times 3.14 \\ &= 78.5 \text{ cm}^2 \end{aligned}$$

Ask students to compare the results found with the formula (78.5cm^2) and the estimate obtained through counting.

AREA: GEOMETRY

OUTCOME: 6. Find the volume for a cube, rectangular solid.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Multiply more than 2 numbers in a problem.
2. Understand the terms base, height, width, and volume.

Steps for Success

1. Students will need a lot of practice with cubes before moving to the formula.

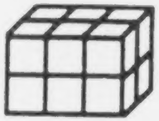
ACTIVITY 1 - OUTCOME 6

Let students work in pairs. Using sugar cubes or colored blocks, (each side measuring one cubic centimeter) give each pair of students 36 cubes.

Students can use these cubes to construct larger cubes and rectangular solids. Then, volumn can be determined.

Model for the students the construction of a rectangular solid. Ask questions such as those below.

Example:



What is the base? 3 cubes x 2 cubes
How many layers? 2
How many cubes were used? 12 (volume)

ACTIVITY 1 - OUTCOME 6 (Cont'd)

Give students the base and number of layers of a rectangular solid. Ask them to construct that rectangular solid and find the missing information.

	Base	Layers	Total number of cubes
Example:	4 x 3	2	(Volume)

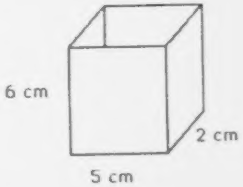
Many times individual cubes cannot be counted to determine volume. In cases like these, a formula can be used.

Base x Width x Height = Volume

4 x 3 x 2 = 24 cm^3

Give students practice using the formula to determine volume.

Example:



5 cm x 2 cm x 6 cm = 60 cm^3
(base) (width) (height) (volume)

AREA: GEOMETRY

OUTCOME: 7. Solve word problems involving area and/or perimeter.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Compute area and perimeter.
2. Add and multiply whole numbers.
3. Know geometric shapes.

Steps to Success

1. It is helpful to draw a picture in order to solve area and perimeter problems.
2. Refer to 4-6 Applications, Outcomes 1, 2, 3 and 4.

MATHEMATICS
4 - 6

AREA: GRAPHS: MAPS AND CHARTS

OUTCOMES:
1. Use number pairs to locate and plot points on a grid.
4. Find the location of a specified place on a grid.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Understand the terms across and up as they apply to a grid.
2. Count blocks on a grid.

Steps to Success

1. Prepare grids or have graph paper for drawing grids.
2. A grid consists of two number lines (axes). One axis is vertical and one is horizontal. The point of intersection is the zero point
3. Numbers in parentheses are called "ordered pairs" because their order is the key to naming their locations. Example: (6, 3)
4. In ordered pairs, the first number goes across the grid and the second number goes up the grid.

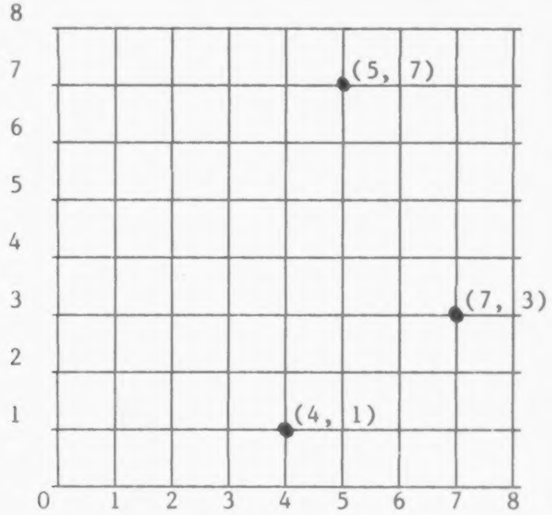
ACTIVITY 1 - OUTCOME 1

The numbers in parentheses are referred to as "ordered pairs". Their order is the key to naming their locations. The first number refers to "across" and the second number refers to "up".

ACTIVITY 1 - OUTCOME 1 (Cont´d)

Draw a grid on the chalkboard and plot points (4,1), (7,3), and (5,7).

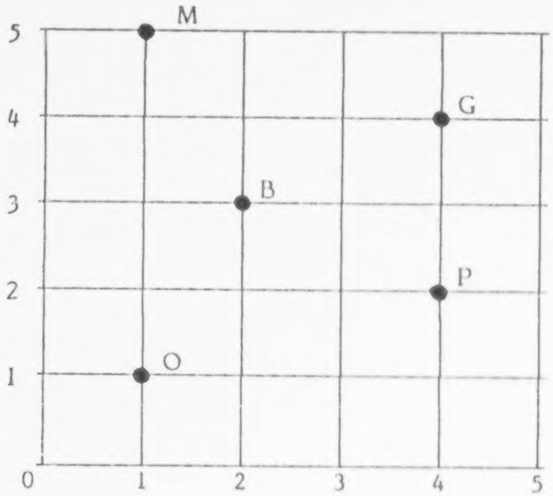
Example:



Let students plot points on the grid and name the ordered pair that corresponds to each plotted point.

ACTIVITY 2 - OUTCOME 4

Use the grid to locate the following places and give their ordered pairs.



O = Post Office	(1,1)
P = Park	(4,2)
B = Bank	(2,3)
G = Grocery Store	(4,4)
M = Municipal Building	(1,5)

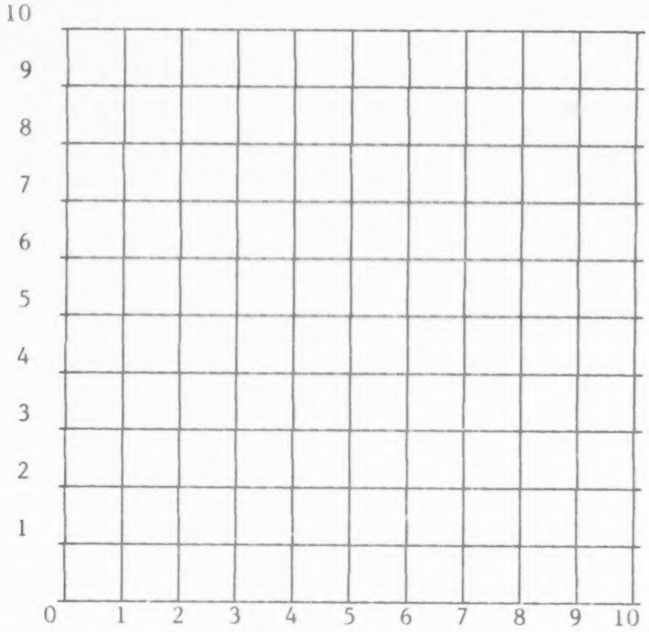
ACTIVITY 3 - OUTCOME 1

Have students to use graph paper to draw a grid that is 10 cm by 10 cm. Label the grid 0 - 10 across and 0 - 10 up.

Call out the following ordered numbers and let students label each point with an X.

1. (4,3)
2. (6,8)
3. (2,9)
4. (7,4)
5. (1,8)
6. (5,3)
7. (7,8)
8. (3,5)
9. (9,1)
10. (8,3)

Example:



MATHEMATICS
4 - 6

AREA: GRAPHS: MAPS AND CHARTS

OUTCOMES:
2. Use frequencies of categories on graphs to determine totals or make comparisons.
3. Use information to construct graphs.
6. Solve problems using information provided on graphs, maps, charts, and diagrams.
7. Interpret information on graphs, tables, maps, charts, and diagrams.

AREA: APPLICATIONS

OUTCOME:
4. Solve process problems which require a table, a chart, a diagram and/or some other type of solution.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Recognize and use simple bar graphs, circle graphs, and pictographs.
2. Draw and plot points on a grid.
3. Use a ruler to draw lines.
4. Solve word problems.
5. Find the percentage of a number.
6. Add and subtract whole numbers.

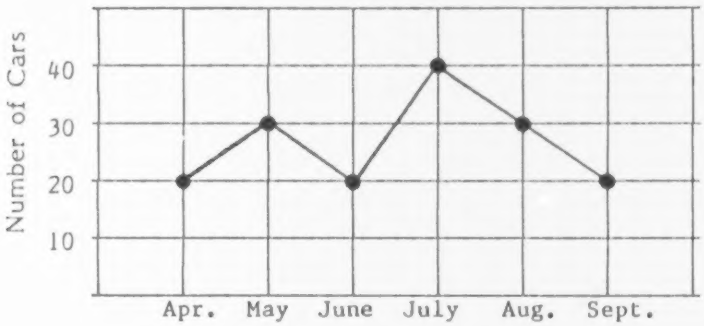
Steps to Success

1. Introduce the line graph as a plotted grid with a connecting line.
2. The line graph shows changes over a period of time.
3. The bar graph lets the student see differences easily and make comparisons quickly.
4. Pictographs are easy to read and are often used to show data involving large numbers.
5. The data on a circle graph is usually shown in percent. The greater the percent, the larger the region on the graph. The sum of the percents on a circle graph must equal 100%.

Steps to Success (Cont´d)

6. Bar graphs can be constructed vertically or horizontally.
7. Vertical bar graphs are read across and up to the scale.
8. Horizontal bar graphs are read across and then down to the scale.
9. Gather graphs from newspapers and magazines to use as examples.

ACTIVITY 1 - OUTCOMES 2, 6, and 7 (APPLICATIONS - OUTCOME 4)



Car Sales for Six Months

Using the information on the graph, answer the following sample questions:

1. What month had the highest number of car sales? (July)

2. What months have the same sales of 30 cars? (May, August)

3. How many cars were sold in June? (20)

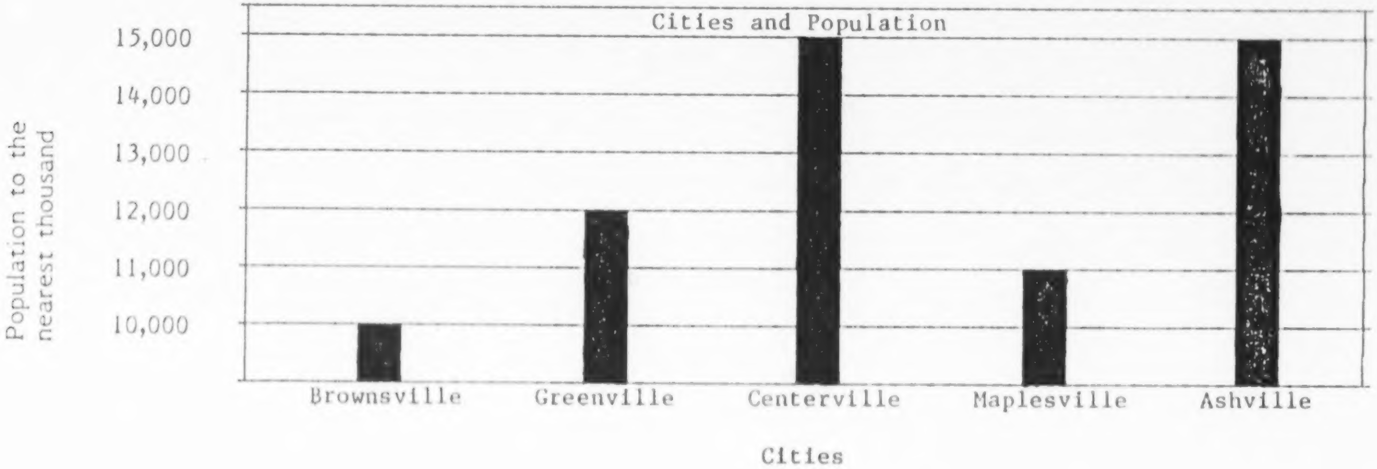
4. What was the total amount in sales for May, June, and July? (30 + 20 + 40 = 90)

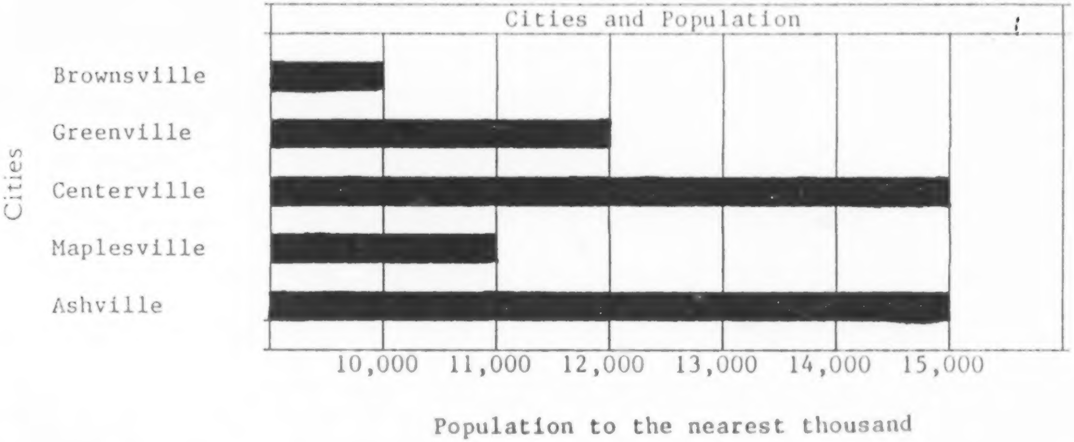
5. What was the total amount in sales for the six months period? (20 + 30 + 20 + 40 + 30 + 20 = 160)

6. Which number of sales appeared most often during the six months period? (20)

ACTIVITY 2 - OUTCOMES 2, 6, and 7 (APPLICATIONS - OUTCOME 4)

Point out to students that bar graphs can be drawn vertically or horizontally. A vertical graph is read up a bar and then across to the scale. A horizontal graph is read across and then down to the scale.





645

646

ACTIVITY 2 - OUTCOMES 2, 6, and 7 (Cont´d)

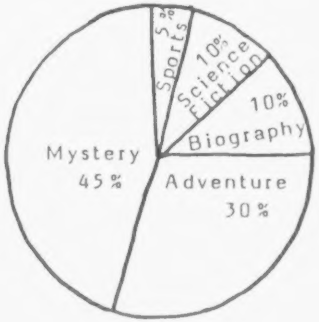
Use the information on the graph to answer the following sample questions.:

1. Which two cities have the largest populations? (Centerville, Ashville)
2. What is the population of Maplesville? (11,000)
3. What is the difference in the population of Brownsville and Centerville? (15,000 - 10,000 = 5,000)
4. What is the difference in the total of the population of the two largest cities and the total of the population in the two smallest cities?
(15,000 + 15,000) + (10,000 + 11,000) = 9,000

ACTIVITY 3 - OUTCOMES 2, 6, and 7 (APPLICATIONS - OUTCOME 4)

Circle graphs are usually shown in percent. The larger the region, the greater the percent. The sum of the percents must equal 100%.

Sixth Grade students read 780 books.



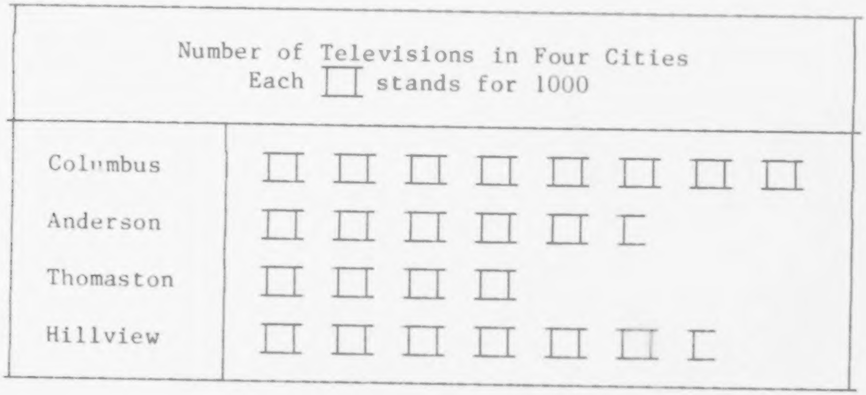
ACTIVITY 3 - OUTCOMES 2, 6, and 7 (APPLICATIONS - OUTCOME 4)

Use the circle graph to answer the following sample questions:

1. What percentage of the books read were about sports? (5%)
2. From which categories were the same percentage of books read? (Science Fiction, Biography)
3. What was the total percentage of Mystery and Adventure books read? (45% + 30% = 75%)
4. How many books read were Adventure? (780 x 30% = 780 x .30 = 234.00 = 234 books)
5. How many books read were Sports? (780 x 5% = 780 x .05 = 39.00 = 39 books)

ACTIVITY 4 - OUTCOMES 2, 6, and 7 (APPLICATIONS - OUTCOME 4)

Graphs are an easy way to compare numbers. Pictographs are especially easy to read. They are used most often to show data involving large numbers. Half symbols will represent half the number of a whole symbol.



ACTIVITY 4 - OUTCOMES 2, 6, and 7 (APPLICATIONS - OUTCOME 4) (Cont´d)

Use the graph to answer the following sample questions.

1. How many televisions are there in Thomaston? (4000)
2. How many televisions are there in Anderson? (5500)
3. What is the total number of televisions for Hillview and Columbus? (6500 + 8000 = 14,500)
4. Which city has the most televisions? (Columbus)

ACTIVITY 5 - OUTCOMES 2, 6, and 7

Obtain graphs, charts, and tables from magazines and newspapers. Prepare questions about graphs to be used as individual work. Also encourage students to find graphs and charts for class use.

ACTIVITY 6 - OUTCOME 3

Place the following chart on the chalkboard.

Example:

Number of Apples Eaten	Days of the Week
3	Sunday
8	Monday
10	Tuesday
4	Wednesday
6	Thursday
7	Friday
5	Saturday

ACTIVITY 6 - OUTCOME 3 (Cont´d)

Divide students into three groups. Using the provided table, have one group construct a line graph another group construct a bar graph, and another group construct a pictograph.

After the completion of the graphs, let each group exchange graphs with another group and ask the following sample questions:

1. On what day were the most apples eaten? (Tuesday)
2. What was the total number of apples eaten during the week? (43 apples)
3. How many apples were eaten on Monday and Friday? (15 apples)
4. Name the day that 5 apples were eaten. (Saturday)

ACTIVITY 7 - OUTCOME 3

Using information obtained by class surveys, students may construct graphs to communicate that information. Sample information might be the favorite recording artist, the favorite soft drink, time spent doing homework, etc.

MATHEMATICS
4 - 6

AREA: GRAPHS: MAPS AND CHARTS

OUTCOMES:
5. Give the coordinates of a location on a map.
6. Solve problems using information provided on graphs, maps, charts, and diagrams.
7. Interpret information on graphs, tables, maps, charts, and diagrams.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Solve word problems.
2. Read grids.

Steps to Success

1. Obtain encyclopedia sets from the library.
2. Have index cards available.
3. Have prepared maps.
4. Review the definitions of scale, key, and direction symbols.

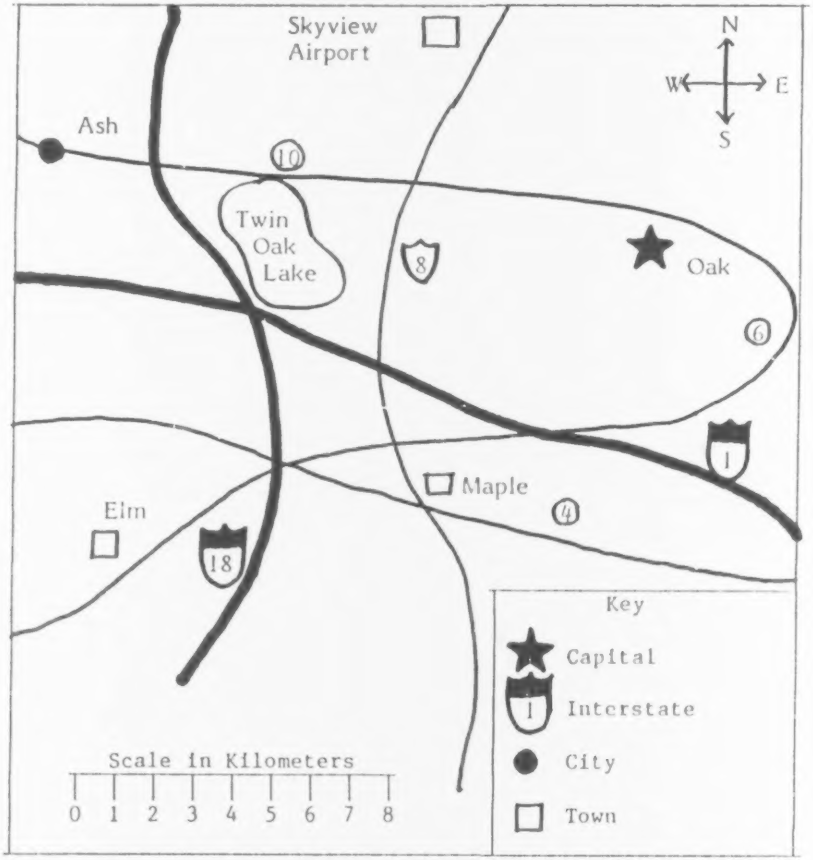
ACTIVITY 1 - OUTCOMES 5, 6, and 7

Define the scale, key, and direction symbols used on maps.

1. A scale shows what the distance on the map equals in actual distance.
2. The key gives the important location labels.
3. The direction symbol or compass shows directions of north, south, east, and west.

ACTIVITY 1 - OUTCOMES 5, 6, and 7 (Cont'd)

Prepare the following sample map.



Skyview Airport
N
W
E
S
Ash
10
Twin Oak Lake
8
Oak
6
1
Maple
4
Elm
18
Key
Capital
Interstate
City
Town
Scale in Kilometers
0 1 2 3 4 5 6 7 8

ACTIVITY 1 - OUTCOMES 5, 6, and 7 (Cont´d)

Instruct students to draw the scale on the edge of an index card. Use the scale, the key, and the direction symbol to answer the following questions.

1. In what direction is Maple from the Skyview Airport?

2. In what direction would you travel to go from Oak to Ash?

3. What is the capital?

4. Using the index card give the distance between each of the following:

    a. Ash to Oak
    b. Maple to Skyview Airport
    c. Maple to Elm

ACTIVITY 2 - OUTCOMES 5, 6, and 7

Obtain encyclopedia sets from the library.

Instruct students to find the map of a state in the encyclopedia. Use a map to review scale, key, and direction symbol or compass. Show students how to locate a place using the scale (numbers and letters) on the sides of maps. Give each student an index card and have him/her draw a portion of the scale along the edge of the card.

ACTIVITY 2 - OUTCOMES 5, 6, and 7 (Cont´d)

Have students do the following activities:

1. Locate the city nearest the intersection 3,E.
2. Locate the city nearest the intersection 7,H.
3. Using the scale along the edge of the index card give the distance between two towns. Name the towns.
4. Find the capital of this state.
5. List at least five counties of this state.
6. Tell what Interstate highway goes through this state.

MATHEMATICS
4 - 6

AREA: GRAPHS AND CHARTS

OUTCOMES:
2. **Use frequencies of categories on graphs to determine totals or make comparisons.**
3. **Use information to construct graphs.**
6. **Solve problems using information provided on graphs, maps, charts, and diagrams.**
7. **Interpret information on graphs, tables, maps, charts, and diagrams.**

NOTES FOR THE TEACHER

Prerequisites for Students

1. Know how to load, boot, and operate a computer assisted instructional package.
2. Be introduced to the concepts of constructing and interpreting graphs.

Steps to Success

1. The teacher should have basic computer skills or access to someone who does.
2. The teacher must have access to computers and appropriate graphing software. For example, MECC disk #137 MECC GRAPH is appropriate for this activity.

ACTIVITY 1 - OUTCOMES 2, 3, 6, and 7

Pair students into research teams. Assign each pair a research topic or allow them to select their own topics. You may wish to provide a list from which students can choose topics or a list of guidelines that the choice must meet. The topics should be limited to things that are readily accessible to the students. They may wish to take a poll of favorite colors of their classmates, survey types of trees found in their neighborhoods, take a poll to find the types of trees found in their neighborhoods, take a poll to find the types of candy bar preferred by their classmates, etc. If appropriate reference material is available, you may wish to pair this activity with social studies or science. Students, might gather information on the different states, regions, or of different countries (population, rainfall, agricultural products, etc.).

ACTIVITY I - OUTCOMES 2, 3, 6, and 7 (Cont'd)

Have students collect their data and then enter the data into the computer using a graph program (MECC disk #137 - MECC GRAPH). This will take some time. If the number of computers is limited, this could be a long-term project that is spread out over several days, and will allow students to be involved in other activities while they wait their turn at the computer. When graphs are complete, have each research pair present their graph to the class and interpret the data. Graphs can then be displayed in the classroom, on a hall bulletin board, or in the cafeteria, so that others can see the results.

AREA: STATISTICS AND PROBABILITY

OUTCOME: 1. Find the mean, median, and mode of a group of numbers.

NOTES FOR THE TEACHER

Prerequisites for Students

1. Add and divide whole numbers.
2. Arrange whole numbers in order from least to greatest.
3. Define mean, median, and mode.

Steps to Success

1. The mean can be found with addition and division, but the median and mode can be found without computation.
2. The mean will be used most often by students in finding their grades.
3. A mode can be useful in predicting future performance.
4. If all numbers are different, there is no mode.
5. If the set has an even number of numerals, the median will be the halfway point between the two middle numerals.

ACTIVITY 1 - OUTCOME 1

Activities for finding the mean of a group of numbers can be found in Operations, Outcome 11.

Write the following group of numbers on the chalkboard: 91, 86, 75, 72, 91.
Ask the students to rank the numerals from least to greatest.

Example: 72 75 86 91 91

ACTIVITY 1 - OUTCOME 1 (Cont´d)

To find the median of this set of numerals locate the middle number. Remember median means middle.

Example: 72 75 $\boxed{86}$ 91 91

Median

To find the mode look for the numerals that appear most in the set.

Example: 72 75 86 $\underbrace{91 \quad 91}_{\text{Mode}}$

When finding the median or mode no computation is needed.

ACTIVITY 2 - OUTCOME 1

Read the following sentence to the students and list scores on the board.

John has the scores of 100, 75, 100, 70, 90, 100, 100 in Spelling.

Arrange scores from least to greatest.

Example:

$$\begin{array}{r} 70 \\ 75 \\ 91 \\ \left.\begin{array}{r} 100 \\ 100 \\ 100 \\ 100 \end{array}\right\} \text{Mode} \end{array}$$

Have students label the mode (the score appearing most often). According to the mode, which score would be a reasonable score for John to expect on the next test? 100

ACTIVITY 3 - OUTCOME 1

Write 80, 61, 74, 78, 72, 61 on the chalkboard. Have students rank the numerals from least to greatest.

Example: 61, 61, 72, 74, 78, 80

To find the median locate the middle numeral. With an even number of numerals there is no middle numeral, so find the two middle numerals. Find the halfway point of the two numbers. Seventy-three (73) is the median of our group of numbers.

Example: 61, 61, 72, 74, 78, 80
↘ ↙
73
Median

When there is an odd number of numerals, find the middle numeral is the median.

Example: 3, ⑨, 15

Median

MATHEMATICS
4 - 6

AREA: APPLICATIONS

OUTCOMES:
1. **Determine if sufficient information is given to solve a problem.**
2. **Solve a word problem using one or more operations.**
3. **Identify and solve the number sentence appropriate to solving a two-step or multi-step word problem.**

NOTES FOR THE TEACHER

Prerequisites for Students

1. Add, subtract, multiply, divide with whole numbers, decimal numbers, and fractions.

Steps to Success

1. Outcome 1 has been explained on pages 230-231 in Basic Skills Instructional Material: Grade 6.
2. Solving word problems may have been discussed in each area of whole and decimal numbers and fractions.
3. Guide students to understand word problems through visualizing and retelling the problem without using numbers.
4. Encourage reading and rereading of word problems for better understanding.
5. Concentrate on the important facts as you read and retell.
6. Ask leading questions to enable the students to better understand what they are looking for in the problem.
7. Look for key words to help find the solution.
8. Writing a number sentence as students retell will clarify the problem.
9. Word problems relating to Outcomes 2, 3, and 4 can be found in the Area of Money.
10. Outcome 4 was discussed under Graphs: Maps and Charts

ACTIVITY 1 - OUTCOME 1

Refer to the Basic Skills Instructional Materials, Grade 6.

ACTIVITY 2 - OUTCOMES 2 and 3

Guide students to read and reread word problems to determine the operation or operations needed to solve the problems. Concentrate on key words and important information.

Point out to students that writing a number sentence as you read will sometimes help in determining what information is needed.

Example:

Twelve students in Mrs. Smith's 5th period class read 8 books each. Seven students in her 6th period class read 14 books each. How many more books did her 6th period students read than her 5th period students?

Guide students to think "How many books did students in each period read?" To find this, you should write a number sentence using multiplication. After the number of books read for both periods has been found, ask how the two numbers can be compared. To find "how many more" you should subtract. Write a number sentence and solve.

(14 x 7) - (12 x 8) = N
98 - 96 = 2

The following are sample word problems to be worked through with students.

Laura has collected 53 stamps from three countries. She has 18 stamps from Germany and 24 stamps from Canada. How many does she have from France?

Write a number sentence and solve.

53 - (18 + 24) = N
53 - 42 = 11

She has 11 stamps from France.

ACTIVITY 2 - OUTCOMES 2 and 3 (Cont´d)

Chris needs to buy 4 children´s tickets at $.50 each and 3 adult tickets at $.75 each for Saturday´s game. How much change will he receive from $5.00? Write a number sentence and solve.

Point out to students that this will be a multi-step problem and they should read it carefully.

Number sentence $5.00 - [(4 x $.50)) + (3 x $.75)] = N
$5.00 - ($2.00 + $2.25) = N
$5.00 - $4.25 = N
$.75 = N

Students are looking for the amount left over from $5.00. Therefore, students will need to find, first, the amount spent. The price for each group of tickets will be found by multiplication. They will total the two amounts and subtract from $5.00.

MATHEMATICS: 4 - 6 AREA: Numeration: Reading, Ordering, Comparing Numbers

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			READING NUMBERS				
		4	Read, write, and order numbers to billions (include word names).	1. Read, write, order, and compare numbers to billions. (numerals and word names)			
		5	Continue practice with reading, writing, and ordering numbers.	2. Identify numbers between two given numbers up to and including hundred thousands.			
	X	6	Continue practice with reading, writing and ordering numbers.	3. Identify numbers that are one hundred more or less than a given number.			
4,5			Demonstrate an understanding of the system of whole numbers and place value by recognizing names for numbers, reading, and interpreting numerals, rounding numbers, and comparing and ordering numbers.	4. Identify the number that is one thousand more or less than a given number. 5. Identify the middle number in a 5 member group up to and including hundreds.			
		4	Compare numbers.	6. Associate a numeral, word name, or numerical expression with an equivalent expression.			
		5	Practice comparing numbers.				
		6	Continue practice in comparing numbers.				
			ODD AND EVEN NUMBERS				
4,5			Identify odd and even numbers.	7. Identify groups of numerals as having all even, odd, or both even and odd numbers.			

MATHEMATICS: 4 - 6 AREA: Numeration: Reading, Ordering, Comparing Numbers (Cont'd)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			PRIME AND COMPOSITE NUMBERS				
		4,5	Recognize prime and composite numbers.	8. Identify groups of numerals as having all prime, composite, or both prime and composite numbers.			
		6	Use simple divisibility tests to determine prime and composite numbers.	9. Find the prime factors of numerals.			
5			Demonstrate an understanding of the fundamental operations and their properties.				
			EXPONENTS				
		6	Understand exponents.	10. Determine the value of a numerical expression written in exponential form.			
				11. Factor numerals and write factors in exponential form.			
			COMMON MULTIPLES AND COMMON FACTORS				
		4,5, 6	Find least common multiples and greatest common factors.	12. Find the least common multiple and greatest common factor.			

MATHEMATICS: 4 - 6 AREA: Numeration: Reading, Ordering, Comparing Numbers (Cont'd)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			NUMBER PATTERNS				
		4	Recognize patterns in multiplication and in series of numbers.	13. Name the missing members in a number pattern.			
		5	Recognize number patterns and relationships.	14. Verbalize the process by which a number pattern was originated.			
		6	Extend understanding and use of number patterns and relationships.	15. Name the missing members in a series of related objects.			
			ROMAN NUMERALS				
		4	Use Roman Numerals to C.	16. Write the Arabic numeral for Roman numerals and vice versa: C D M			
		5	Use Roman Numerals to D.				
		6	Use Roman Numerals to M.				
			ORDINAL NUMBERS				
		4	Extend use of ordinal numbers.	17. Use ordinal numbers to describe an object's relative position in a sequence.			

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			ROUNDING				
		4	Round numbers to nearest thousand.	18. Round numerals to the nearest ten, hundred, and/or thousand.			
		5	Continue practice with rounding numbers to tens, hundreds, and thousands.				
	X	6	Round numbers less than 100 to the nearest whole number; round large numbers to 100´s and 1000´s.				
		6	Extend rounding of numbers.				
4,5			Demonstrate an understanding of the system of whole numbers and place value by recognizing names for numbers, reading and interpreting numerals, rounding numbers, and comparing and ordering numbers.				

MATHEMATICS: 4 - 6 AREA: Numeration: Reading, Ordering, Comparing Numbers (Cont'd)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			PLACE VALUE				
		4	Recognize place value to billions.	19. Identify the place value of any digit in a numeral.			
		5	Continue practice with place value to billions.	20. Name the numeral for any number expressed in expanded notation.			
		6	Extend practice with billions.	21. Name numerals for numbers expressed as thousands, hundreds, tens, and/or ones.			
4,5			Demonstrate an understanding of the system of whole numbers and place value by recognizing names for numbers, reading and interpreting numerals, rounding numbers, and comparing and ordering numbers.	22. Write numerals in expanded notation.			
			MATHEMATICAL SYMBOLS				
		4,5 6	Extend use of symbols +, −, x, −, =, <, >, ( ).	23. Complete a number sentence by providing the missing symbol(s). (Ex. 5 3 = 8) 24. Use numbers and symbols to write mathematical expressions describing realistic situations.			

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			MATHEMATICAL SYMBOLS (Cont´d)				
4,5			Demonstrate an understanding of fundamental operations and their properties.				

MATHEMATICS: 4 - 6 AREA: Operations With Whole Numbers

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
		4	Review and extend knowledge of basic facts.	1. Demonstrate a knowledge of basic addition, subtraction, division, and multiplication facts by solving problems on a timed test.			
		5,6	Review basic facts.	2. Add and subtract whole numbers.			
				3. Multiply and divide whole numbers.			
		4	Add and subtract up to four numbers to four digits with regrouping.	4. Name the missing factor in a multiplication sentence.			
		5	Add and subtract up to five numbers to five digits with regrouping.	5. Multiply by multiples of 10, 100, and 1000.			
		4	Multiply and divide with two-digit numbers with regrouping.	6. Use commutative property of addition and multiplication to check answers to problems.			
		5	Multiply with three-digit multipliers and divide with three-digit divisors (with regrouping).	7. Use associative property of addition and multiplication to check problems with three or more addends and/or three or more factors.			
	X	6	Add and subtract numbers to five-digits with regouping, multiply and divide with multipliers and divisors up to and including two digits; state remainders in whole numbers only; include multipliers, divisors, and dividends which contain zero and one.	8. Round numbers to estimate sums, differences, products, and quotients.			
				9. Select the most reasonable answers to addition, subtraction, division, and/or multiplication problems.			
				10. Recognize and locate calculation errors in computation problems.			

MATHEMATICS: 4 - 6 AREA: Operations With Whole Numbers (Cont´d)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
		6	Extend addition and subtraction to six-digit numbers and multipliers and divisors to three digits.	11. Find averages.			
		4	Multiply by 10, 100, and 1000.	12. Write an addition sentence using a given subtraction sentence and vice versa.			
		5	Begin multiplying by multipliers of 10, 100, and 1000.	13. Write a division sentence using a given multiplication sentence and vice versa.			
		6	Continue multiplying by multiples of 10, 100, and 1000.	14. Solve simple horizontal equations.			
		5	Identify missing factors in multiplication sentences.				
		6	Recognize and identify missing factors in multiplication sentences.				
		4	Apply commutative and associative concepts.				
		5,6	Extend application of commutative and associative concepts.				
		4	Practice estimation and approximation.				

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
		5	Extend estimation and approximation.				
		6	Continue practice with estimation and approximation.				
	X	4,5 6	Round numbers to obtain sums, differences, products, and quotients.				
		4,5	Select reasonable answers to computation problems.				
	X	6	Using numbers to five-digits, select the most reasonable answer to computation problems.				
		4,5	Recognize and locate calculation errors.				
	X	6	Recognize and locate: calculation errors in problems with more than one operation; decimal placement; solve division problems with zero in the quotient.				

MATHEMATICS: 4 - 6 AREA: Operations With Whole Numbers (Cont´d)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
		4	Practice number patterns in multiplication.				
		5	Continue practice in factoring and number patterns.				
		6	Extend practice in factoring and number patterns.				
		4	Begin finding simple averages.				
	X	5,6	Find averages using whole numbers.				
		4	Recognize inverse relationship between addition and subtraction, multiplication and division.				
		5,6	Recognize and practice using the inverse relationship between addition and subtraction, multiplication and division.				
		6	Solve simple horizontal equations.				
4,5			Addition with whole numbers.				
4,5			Subtraction with whole numbers.				
4,5			Multiplication with whole numbers.				
4,5			Division with whole numbers.				

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			NAMING FRACTIONS				
4,5			Name, order, and interpret fractions, decimals, and integers.	1. Name the designated part of a region or set as a common fraction.			
				2. Name the relationship between the lengths of two line segments as a common fraction.			
			MIXED NUMBERS, IMPROPER AND PROPER FRACTIONS				
		4	Recognize proper and improper fractions and mixed numbers.	3. Rename mixed numbers as improper fractions and vice versa.			
		5	Identify proper and improper fractions and mixed numbers.	4. Identify a fraction as a proper or improper fraction.			
		6	Continue practice in identifying improper fractions and mixed numbers.				
		4	Begin changing improper fractions to mixed numbers.				
		5	Change improper fractions to mixed numbers.				
		6	Changing improper fractions to mixed numbers.				
4,5			Name, order, and interpret fractions, decimals, and integers.				

MATHEMATICS: 4 - 6 AREA: Fractions (Cont´d)

S T A N	B C T	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	B A S	S T A N	A D V
			REDUCING FRACTIONS				
		4	Reduce fractions to lowest terms.	5. Reduce fractions to simplest terms.			
		5	Continue reducing fractions to lowest terms.				
		6	Reinforce reducing fractions to lowest terms.				
			ORDERING AND COMPARING				
		4	Find least common denominators.	6. Find the least common denominator. (lcm, ball park method)			
		5	Continue practice in finding least common denominators.	7. Find equivalent fractions.			
		6	Extend finding least common demominators.	8. Order and compare fractions.			
		4	Order unit fractions with like or unlike denominators.	9. Use comparative terms and symbols to compare fractions.			
		5	Order fractions with denominators of 2, 3, 4, 5, 8, and 10 and with numerators greater than 1.				
	X	6	Order fractions with denominators of 2, 3, 4, 5, 8, 10, 100.				
		4,5 6	Extend ordering fractions.				

MATHEMATICS: 4 - 6 AREA: Fractions (Cont´d)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			ORDERING AND COMPARING (Cont´d)				
		4,5 6	Compare fractions.				
		4	Begin finding equivalent fractions.				
		5	Continue practice of finding equivalent fractions.				
		6	Calculate equivalent fractions.				
			COMPUTATION WITH FRACTIONS				
		4	Add and subtract fractions with like and unlike denominators.	10. Add and subtract fractions, mixed numbers, and/or whole numbers.			
		5	Add, subtract, and multiply fractions.	11. Solve word problems involving addition and/or subtraction of fractions.			
	X	6	Add, subtract, and multiply fractions with denominators 2, 3, 4, 5, 8, 10, 12, 100.	12. Multiply and divide fractions, mixed numbers, and/or whole numbers.			

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			COMPUTATION WITH FRACTIONS (Cont´d)				
		6	Extend adding, subtracting and multiplying fractions with any denominator.	13. Convert fractions to decimals.			
		4	Add and subtract mixed numbers.	14. Estimate: sums differences products, and/or quotients of fractions.			
		5	Add, subtract, and multiply mixed numbers.	15. Solve word problems involving fractions.			
		6	Add, subtract, and multiply mixed numbers and fractions with whole numbers.				
		5	Recognize fractions of $\frac{1}{2}$ and $\frac{1}{4}$ dollar as decimals.				
		6	Use fractions of $\frac{1}{2}$ and $\frac{1}{4}$ dollar as decimals.				
		4	Recognize fractions as a form of division.				
		5	Recognize and use fractions as a form of division.				
		6	Continue recognizing and using fractions as a form of division.				

MATHEMATICS: 4 - 6 AREA: Fractions (Cont´d)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			COMPUTATION WITH FRACTIONS (Cont´d)				
		4,5 6	Solve word problems involving fractions.				
		6	Divide fractions (multiply using reciprocal).				
		4	Estimate sums, differences, and products.				
		5	Practice estimating sums, differences, products and quotients.				
		6	Continue estimating sums, differences, products and quotients.				
4,5			Computation with fractions and decimals.				

MATHEMATICS: 4 - 6 AREA: Decimals

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			PLACE VALUE				
		4	Identify place value to hundredths.	1. Identify the place value for a given digit in a decimal fraction or a mixed decimal through thousandths. (ex. 20.356)			
		5	Continue identification of place value to thousandths.				
		6	Reinforce place value identification.	2. Write the numeral for a given whole number and decimal fraction. (ex. 5 ones, 6 tenths)			
4,5			Name, order, and interpret fractions, decimals, and integers.				
			ORDERING				
		4	Begin ordering decimals to hundredths.	3. Compare and order decimals and/or mixed numbers.			
		5	Order decimals to hundredths.	4. Find equivalent decimals and mixed numbers.			
	X	6	Order decimals up to and including hundredths.	5. Use comparative terms and symbols to compare decimals.			
		6	Extend ordering decimals to thousandths.				
4,5			Name, order, and interpret fractions, decimals, and integers.				

709

708

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			CONVERTING DECIMALS				
		5	Express simple decimal fractions as common fractions and vice versa.	6. Convert a decimal to a fraction and vice versa.			
	X	6	Change fractions of 1/2 and 1/4 dollar to decimals, fractions of 1/5, 1/4, and 3/4 to decimals; 0, 20, 0.25, 0.75 to fractions.				
		6	Extend expression of decimal fractions as common fractions and vice versa.				
5			Name, order, and interpret fractions, decimals, and integers.				
			OPERATIONS INVOLVING DECIMALS				
		4	Add and subtract two decimal fractions up to and including hundredths.	7. Add and subtract decimal numbers, mixed numbers, and/or whole numbers.			
	X	5,6	Add and subtract decimal numbers to thousandths.	8. Multiply and divide decimal numbers, mixed numbers, and/or whole numbers.			
				9. Solve word problems involving decimals.			
				10. Estimate the answer to problems involving decimals.			

S T A N	B C T	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	B A S	S T A N	A D V
			OPERATIONS INVOLVING DECIMALS (Cont´d)				
		6	Extend addition and subtraction of decimal numbers.	11. Find the average of decimal numbers and/or mixed decimals.			
		6	Multiply and divide decimal numbers to thousandths.				
		5	Solve number sentences involving one or two operations.				
		6	Formulate and solve number sentences involving one or more operations.				
4,5			Computation with fractions and decimals.				
		6	Practice estimation with decimal computation.				
		6	Compute averages of decimal numbers.				
			ROUNDING DECIMALS				
		6	Round decimals from thousandths to hundredths and hundredths to tenths.	12. Round decimal numbers or mixed decimals.			

MATHEMATICS: 4 - 6 AREA: Ratio, Proportion, and Percent

S T A N	B C T	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	B A S	S T A N	A D V
			RATIOS				
		6	Understand and use ratio definition and symbols (e.g. 2/3 and 2:3)	1. Use ratios to compare numbers.			
				2. Use ratio symbols to express two numbers.			
		6	Find equivalent ratios by use of equivalent fractions or colon form.	3. Find equivalent ratios.			
			PROPORTION				
		6	Establish proportions using equivalent fractions.	4. Determine proportions.			
5			Solve proportions.	5. Solve a proportion in which a numerator or denominator is unknown.			
			PERCENTS				
		6	Express fractions and ratios as equivalent percents.	6. Understand the vocabulary related to percents: percent percentage percent symbol (%)			
		6	Recognize meaning of percent, percentage, and the percent symbol (%).	7. Change a percent to a decimal and vice versa.			
		6	Using fractional and decimal forms, relate percents to part of one hundred.	8. Change a fraction to a percent and vice versa.			
				9. Calculate the percent and percentage of a number.			

MATHEMATICS: 4 - 6 AREA: Ratio, Proportion, and Percent (Cont´d)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			PERCENTS (Cont´d)				
		6	Using simple common fractions, change percents to fractions and vice versa.	10. Solve word problems using percents.			
		6	Using simple decimals, change percents to decimals and vice versa.				
		6	Compute the percent of a number.				
		6	Find one number as a percent of another number.				
		6	Find a number when percent and percentage are given.				
		6	Solve simple number sentences using percents.				

MATHEMATICS: 4 - 6 AREA: Time, Measurement, and Money:

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			MEASUREMENT (MASS)				
		4	Recognize and use mass/weight abbreviations/symbols of both metric and customary measures.	1. Write and read mass/weight symbols for customary and metric measures.			
		5	Understand and use mass/weight abbreviations/symbols of both metric and customary measures.	2. Weigh objects and report mass/weight in metric and customary units.			
		6	Extend use of mass/weight abbreviations/symbols of both metric and customary measures.	3. Convert mass/weight within metric and customary measures.			
		4	Practice reading scales to measure mass/weight in grams, kilograms, ounces or pounds.	4. Solve word problems involving mass/weight units of measure.			
		5	Continue to practice reading scales to measure mass/weight in grams, kilograms, ounces or pounds.	5. Solve word problems involving conversion of mass/weight units.			
		6	Extend practice and accuracy in reading scales to measure mass/weight in grams, kilograms, ounces or pounds.				
		4	Demonstrate knowledge of conversion facts to change kilograms to grams; and among customary measures.				

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			MEASUREMENT (MASS) (Cont´d)				
		5	Use knowledge of conversion facts to change kilograms to grams and vice versa; and among customary measures.				
		6	Extend use of conversion facts to change among metric measures, and among customary measures.				
		4	Build precise skills in measuring with mass/weight measures.				
		5	Practice measuring with mass/weight measures to enhance precision.				
		6	Continue to practice measuring with mass/weight measures to increase precision.				
		4	Continue solving word problems involving measurement.				
		5	Practice solving word problems involving measurement.				
		6	Refine problem-solving skills in doing word problems involving measurement.				

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			MEASUREMENT (CAPACITY)				
		4	Recognize and use capacity abbreviations/symbols (c., pt., qt., gal.; kL, hL, daL, L, dL, cL, mL.)	6. Write and read capacity symbols for metric and customary systems.			
		5	Understand and use abbreviations/ symbols of both customary and metric measures.	7. Measure capacities and report in metric and customary units of measure.			
		6	Continue using abbreviations/symbols of both customary and metric measures.	8. Convert capacities within metric and customary units of measure. 9. Solve word problems involving capacity.			
		4	Measure capacities to nearest cup, pint, quart, gallon, liter and mililiter.	10. Solve word problems involving conversion of capacity units.			
		5	Continue practice in measuring to nearest ounce, cup, pint, gallon, liter, and milliliter.				
	X	6	Measure capacities to nearest milliliter and ounce.				
		6	Extend practice measuring capacities to nearest liter and milliliter, ounce, cup, pint, gallon.				

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAS	ADV
			MEASUREMENT (CAPACITY) (Cont´d)				
		4	Demonstrate knowledge of conversion facts by changing liters to milliliters; and among customary measures.				
		5	Use knowledge of conversion facts to change liters to milliliters and vic versa and among customary measures.				
		6	Extend use of conversion facts to change among all metric units and among all customary units.				
		4	Build precise skills in measuring capacity.				
		5	Practice measuring with capacity measures to enhance precision.				
		6	Continue to practice measuring with capacity measures to increase precision.				
		4	Continue solving word problems involving measurements.				

MATHEMATICS: 4 - 6

AREA: Time, Measurement, and Money (Cont´d)

S T A S	B C T	C OF S #	ORIGINAL SOURCES	STUDENT OUTCOMES	B A S	S T A S	A D V
			MEASUREMENT (CAPACITY) (Cont´d)				
		5	Practice solving word problems involving measurement.				
		6	Refine problem-solving skills in doing word problems involving measurement.				
			MEASUREMENT (LENGTH)				
		4	Recognize and use linear abbreviations/symbols of both customary and metric measures (in., ft., yd., and mi.; km, hm, dam, m, dm, cm, mm.)	11. Select the appropriate unit of measure for measuring a specified object. 12. Write and read the symbols for customary and metric measures of length.			
		5	Understand and use linear abbreviations/symbols of both customary and metric measures.	13. Measure lengths and report in metric and customary units. 14. Add and subtract problems involving linear measurement.			
		6	Continue using linear abbreviations/symbols of both customary and metric measures.				

S T A N	B C T	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	B A S	S T A N	A D V
			MEASUREMENT (LENGTH) (Cont´d)				
		4	Measure lengths to nearest (meter, decimeter, and centimeter) and to nearest (yard, foot, inch, and to 1/4 inch).	15. Estimate the length of an object given the unit of measurement. 16. Convert linear/length within metric and customary units of measure.			
		5	Continue measuring lengths to nearest yard, foot, inch and to 1/8 inch, and nearest meter, decimeter, centimeter, millimeter.	17. Solve word problems involving linear units of measurement.			
	X	6	Measure lengths to nearest millimeter and to nearest 1/8 inch.	18. Solve word problems involving conversion of linear units.			
		6	Extend measuring lengths to include measuring to the nearest 1/16 inch.				
		4	Demonstrate knowledge of conversion facts among customary measures and for changing meters to centimeters and centimeters to meters.				
		5	Convert customery units and meters to centimeters and millimeters and vice versa.				
		6	Extend use of conversion facts to change among customary units and among metric units.				

MATHEMATICS: 4 - 6 AREA: Time, Measurement, and Money (Cont´d)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			MEASUREMENT (LENGTH) (Cont´d)				
		4	Estimate linear distances to nearest meter, decimeter, and centimeter; and to nearest yard and foot.				
		5	Practice estimating linear distances to nearest meter, decimeter, and centimeter, and to nearest yard, foot, and inch.				
		6	Continue practice in estimating linear distances to nearest meter, decimeter, centimeter, and millimeter; and to nearest yard, foot, and inch.				
		4	Build precise skills in measuring with linear measures.				
		5	Practice measuring with linear measure to enchance precision.				
		6	Continue to practice measuring with linear measures to increase precision.				
		4	Continue solving word problems involving measurement.				

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			MEASUREMENT (LENGTH) (Cont´d)				
		5	Practice solving word problems involving measurement.				
		6	Define word problem-solving skills in doing word problems involving measurement.				
4,5			Demonstrate an understanding of the principles of geometry and measurement.				
			MONEY				
		4	Read and write money values to $100.	19. Read and write money values.			
		5	Continue reading and writing money values to $1000.	20. Write fractional parts of a dollar in decimal form.			
	X	6	Read and write (using numbers and words) money values (in dollars and cents) to $200.	21. Add and subtract money values. 22. Multiply and divide money values.			
		6	Extend reading and writing money values.	23. Name the value of a set of coins and/or bills. 24. Determine and make change.			
		5	Recognize fractions of 1/2 and 1/4 dollar as decimals.	25. Solve word problems involving money.			
		6	Use fractions of 1/2 and 1/4 dollar as decimals.				

MATHEMATICS: 4 - 6 AREA: Time, Measurement, and Money (Cont'd)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			MONEY (Cont'd)				
		4	Add and subtract money values using dollar signs and decimals.	26. Determine sales tax on a purchase using a sales tax table.			
		5	Add and subtract money values.	27. Calculate total price of an item that has been discounted by a percentage.			
		6	Extend addition and subtraction of money values.	28. Calculate simple interest.			
	X	6	Add and subtract dollars and cents in amounts to $200.00.	29. Compute hourly wages with no deductions.			
		5	Multiply and divide money values using one-digit multipliers and divisors.	30. Use comparative shopping skills in solving consumer problems.			
		4	Determine value of a collection of money.				
		5	Extend determination of value of a collection of money.				
		4	Determine, make, and count change up to $20.00.				
		5	Practice determining, making, and counting change up to $50.00.				
	X	6	Determine change on a purchase up to $20.00.				

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			MONEY (Cont´d)				
		6	Extend practice in determining, making, and counting change up to $100.00				
		6	Begin work with multiple purchasing, discounts, and unit pricing.				
		6	Read simple sales tax tables.				
		6	Determine cost of credit purchasing.				
		4	Solve word problems involving money.				
		5	Continue solving word problems involving money and consumer information.				
	X	6	Use comparative shopping skills in solving problems involving money.				
		6	Extend practice in solving problems involving money.				
		5	Solve simple problems involving the computation of wages without deductions.				

S T A N	B C T	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	B A S	S T A N	A D V
			MONEY (Cont'd)				
	X	6	Compute wages without deductions.				
		4	Demonstrate ability to identify telephone, area code, zip code, and address numbers.				
		5	Continue practicing the identification of telephone, area code, zip code.				
	X	6	Identify telephone, area code, zip code, and address numbers.				
4,5			Demonstrate an understanding of the principles of geometry and measurement.				
			CLOCK TIME				
		4	Tell time in hours and minutes using both circular and digital clocks.	31. Tell time using a circular or digital clock. 32. Determine elapsed time.			
		5	Continue telling time in hours and minutes.	33. Use conversion facts of time measures to solve word problems.			
	X	6	Use clocks to read time in hours and minutes and determine elapsed time.	34. Solve word problems involving time zones.			
		4	Determine elapsed time by simple computation.				

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			CLOCK TIME (Cont´d)				
		5	Compute elapsed time from simple word problems.				
		6	Extend determining elapsed time using hours and minutes, days in week, and month and weeks in year.				
		4	Convert hours to minutes and minutes to seconds using conversion facts.				
		5	Demonstrate knowledge of conversion facts by changing hours to minutes and seconds and minutes to seconds.				
		6	Use ability to convert among units of time to solve problems.				
		5	Add and subtract units of time.				
		6	Practice adding and subtracting units of time.				
		6	Become familiar with different time zones across the United States.				
		6	Determine a time in one time zone given the time in another time zone.				

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			CLOCK TIME (Cont´d)				
4,5			Demonstrate an understanding of the principles of geometry and measurement.				
			CALENDAR TIME				
		4	Solve simple problems with number of days in week and month and months in year.	35. Solve problems involving weeks, months, and/or days.			
		5	Continue solving problems using days in week, days in month, and weeks in year.				
	X	6	Use calendar in solving problems using weeks in year and days in month.				
4,5			Demonstrate an understanding of the principles of geometry and measurement.				

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
			DEGREES				
		4	Demonstrate ability to read thermometers in degrees Celsius and degrees Fahrenheit.	36. Name the boiling point of water and normal body temperature in degrees Celsius and Fahrenheit.			
		5	Practice reading thermometers in degrees Celsius and degrees Fahrenheit.				
		6	Continue to practice reading thermometers in degrees Celsius and degrees Fahrenheit.				
		4	Continue using knowledge of freezing and boiling points of waters, and normal body temperatures in both metric and customary measures.				

MATHEMATICS: 4 - 6 AREA: Geometry

STAN	BCT	C OF S	ORIGINAL SOURCES
		4	Recognize and name plane figures (square, rectangle, circle, triangle, and parallelogram).
		5	Identify and name plan figures (square, circle, triangle, parallelogram, trapezoid).
	X	6	Recognize angle, triangle, circle, rectangle, square, radius, and diameter.
		4	Recognize, name and use points, line segments, and rays.
		5	Identify and use points, lines, line segments, and rays.
		6	Extend work with all plane figures.
		5	Recognize circumference of circle as perimeter, diameter as distance across and radius as half the diameter.
		6	Identify properties of a circle (radius, diameter, and circumference).

STUDENT OUTCOMES

1. Recognize, name, and illustrate:
   - squares
   - rectangles
   - circles
   - radius
   - diameter
   - circumference
   - triangles (equilateral, isosceles, and scalene)
   - trapezoids
   - angles
   - right angles
   - acute angles
   - obtuse angles
   - points
   - line segments
   - rays
   - parallel lines
   - perpendicular lines
   - intersecting lines
2. Use instruments to increase precision in drawing geometric figures.
3. Recognize, name, and illustrate:
   - cubes
   - rectangular solids
   - spheres
   - cylinders
   - cones

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
		4	Recognize and name parallel lines, perpendicular lines, and intersecting lines.	4. Identify parts of a solid figure (edge, face). 5. Find the area of a: square rectangle circle triangle			
		5	Identify parallel lines, perpendicular lines, and intersecting lines.				
	X	6	Identify parallel and perpendicular lines.	6. Find the volume for a: cube rectangular solid			
		4	Recognize and name right angles, acute angles, and obtuse angles.	7. Solve word problems involving area and/or perimeter.			
		5	Identify right angles, acute angles and obtuse angles.				
		6	Continue identification of right, acute, and obtuse angles.				
		4	Recognize and name solid figures (cube and rectangular solid).				
		5	Recognize and name solid figures (sphere, cube, rectangular solid, cylinder, and cone).				
	X	6	Recognize sphere, cube, rectangular solid, cylinder, and cone.				
		6	Use a protractor to measure angles.				

749

745

MATHEMATICS: 4 - 6 AREA: Geometry (Cont´d)

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
		6	Construct angles and circles.				
		6	Identify kinds of triangles (equilateral, isosceles, and scalene).				
		4	Use unit cubes to determine volume of larger cubes and other rectangular solids.				
		5	Calculate volume of cubes and rectangular solids.				
		6	Extend calculation of volume of cubes and rectangular solids.				
		4	Recognize lines of symmetry.				
		5	Identify lines of symmetry.				
		6	Determine lines of symmtry.				
		4	Recognize congruent shapes.				
		5	Identify congruent shapes.				
		6	Identify and determine congruent shapes.				
		4	Calculate perimeter of polygons.				

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
		5	Continue to practice calculation of perimeter of polygons.				
	X	6	Find perimeters of polygons.				
		6	Extend practice of finding perimeters to solving word problems involving realistic situations.				
		4	Find area of square and rectangle.				
		5	Practice finding area of rectangle, square, circle, and triangle.				
	X	6	Find rectangular areas.				
		6	Extend practice of finding areas to solving word problems involving realistic situations.				
4,5			Demonstrate an understanding of the principals of geometry and measurement.				

MATHEMATICS: 4 - 6 AREA: Graphs: Maps and Charts

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
		4	Read and chart number pairs on a grid.	1. Use number pairs to locate and plot points on a grid.			
		5	Continue reading and charting number pairs on a grid.	2. Use frequencies of categories on graphs to determine totals or make comparisons.			
		6	Extend practice in reading and charting number pairs on a grid.	3. Use information to construct graphs.			
		4	Interpret and construct bar, double bar, line, and circle graphs.	4. Find the location of a specified place on a grid.			
		5	Continue practice in interpretation and construction of bar, double bar, and circle graphs.	5. Give the coordinates of a location on a map.			
	X	6	Read and interpret bar, circle, and line graphs.	6. Solve problems using information provided on graphs, maps, charts, and diagrams.			
		6	Extend practice in interpretation and construction of bar, double bar, line, circle graphs.	7. Interpret information on graphs, tables, maps, charts, and diagrams.			
		4	Interpret information on maps and charts.				
		5	Continue practice in interpreting information on maps, charts, and diagrams.				

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
		6	Extend interpretations of information on maps, charts, and graphs.				
		5	Use information from simple graphs, maps, charts, and diagrams to solve problems.				
		6	Continue practice in solving problems using information from graphs, maps, charts, and diagrams.				
4,5			Demonstrate the ability to read and interpret charts and single bar graphs.				

MATHEMATICS: 4 - 6 AREA: Statistics and Probability

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
		6	Understand the meanings of mean, median, and mode.	1. Find the mean, median, and mode of a group of numbers.			
		6	Find the mean, median, and mode of group of numbers.				
		6	Understand the definition of probability as it relates to the occurrence of an event.				
		6	State probability of an event as a fraction or as a percent.				

MATHEMATICS: 4 - 6 AREA: Applications

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
		4	Examine problems to determine if sufficient information is given for finding solutions.	1. Determine if sufficient information is given to solve a problem. 2. Solve a word problem using one or more operations. (Ex. rate problems) 3. Identify and solve the number sentence appropriate to solving a two-step or multi-step word problem. 4. Solve process problems which require a table, a chart, a diagram, and/or some other type of solution.			
		5	Continue to examine problems to determine if sufficient information is given for finding solutions.				
	X	6	Determine if sufficient information is provided for the solution of a problem.				
		4	Formulate and solve word problems that require use of one of the four operations.				
		5	Practice formulating and solving word problems that require use of one of the four operations.				
		6	Extend practice of formulating and solving word problems that require use of one of the four operations.				
		4	Practice solving word problems involving more than one operation.				
		5	Continue practicing solving word problems involving more than one operation.				

STAN	BCT	C OF S	ORIGINAL SOURCES	STUDENT OUTCOMES	BAS	STAN	ADV
		6	Extend practice of solving word problems involving more than one operation.				
		4	Solve problems related to careers.				
		5	Practice solving problems related to careers.				
		6	Extend work with solving problems related to careers.				
		4	Solve problems involving more than one step by expressing the problem in a number sentence.				
		5	Use number sentences to represent a one-or two-step problem involving more than one operation.				
		6	Continue practice in expressing one- and two-step problems in number sentences.				
4,5			Solve problems, express problems as number sentences, and identify missing or irrelevant data.				